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SOIL SURVEY INTERPRETATIONS FOR WOODLAND CONSERVATION

SOUTH CAROLINA....PROGRESS REPORT

COASTAL PLAIN AND SANDHILLS

VOLUME 1 1961

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COVER PICTURE

This scene was repeated approximately 2,000 times over the State as specially trained teams composed of a forester and a soil scientist secured the data on which this publication is based. SC-1524-6

Note: *Basic data for figures 2, 3, 4, and 5 furnished by U. S. Weather Bureau.*

Erratum: *Captions for plates 12 and 13 on page 65 should be reversed.*

SOIL SURVEY INTERPRETATION
FOR
WOODLAND CONSERVATION
SOUTH CAROLINA PROGRESS REPORT
COASTAL PLAIN AND SANDHILLS
VOLUME I

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IMPORTANCE OF WOODLAND CONSERVATION IN SOUTH CAROLINA

Two of every three acres in South Carolina are woodlands. In 1959 woodland resources provided raw products valued at 386 million dollars. These materials were processed by 1400 wood-using plants that employed 30,000 workers. Forest industries and workers are vital in our economy. They produce thousands of products which improve our standard of living and our health.

Well-managed woodlands protect watersheds and help assure an adequate supply of good water. People and industries require large quantities of water, for example, the city of Columbia uses an average of about 13.7 million gallons of water each day; the city of Greenville purchased and manages approximately 9,000 acres of land to protect its water supply; Lake Murray, a hydroelectric reservoir, is capable of storing 1,613,860 acre-feet of water to generate millions of kilowatt hours of electricity; the pulp and paper mill at Georgetown uses approximately 20,000 gallons of water per minute in the paper making process.

Forest cover protects soil from erosion. Sediment from eroded land fills reservoirs, stream channels, and harbors, and increases flooding. Dredging the harbor at Charleston during 1960 cost 1.5 million dollars. Forest cover slows runoff, and enables more water to enter the soil faster. Stream flow is more even, quality of water is improved, and sediments reduced, when forest cover is present.

Forests provide recreation areas. More than 3 million vacationists, campers, swimmers, and picnickers visit our state parks annually, to find respite from the city or their labor. During 1960 fishermen, hunters, and sportsmen made 130,000 visits to the National Forests in South Carolina.

Forests furnish a home for wildlife. Woodlands are the natural habitat of many wild creatures. Food and cover are abundant where well-managed forests occur in association with properly treated agricultural lands. Wildlife resources are important to society in many ways, some of which can be evaluated in terms of economic returns.

Trees are products of the soil, but neither soil nor forests are indestructible or inexhaustible. If soil is misused, depleted, or eroded, its usefulness for growing trees, or providing other related benefits, is impaired. Likewise, carelessness and abuse of woodlands may result in waste and destruction of forest resources.

Woodland conservation, the intelligent care and use of forest lands, concerns everyone. It is a vital part of the soil and water conservation program. It is important that woodlands be wisely used and conserved to benefit our people.

The 1958 forest survey (Larson, 1960) (1) shows that the size and quality of trees being harvested in South Carolina generally are decreasing. It is pointed out that the amount and kind of timber which will be available in the future depends largely upon the actions of private landowners because they own 77 percent of the total commercial forest land in South Carolina.

Results of the Conservation Needs Inventory, completed in 1959 by the U. S. Department of Agriculture, estimate that approximately 11½ million acres will be required for woodland production in South Carolina by 1975. At the present time, 2¼ million acres need timber stand establishment, over 3 million acres need timber stand improvement, approximately 4½ million acres need additional protection from fire, insects, and diseases, more than ½ million acres need protection from animals, and 100,000 acres need erosion control and establishment of shelter belts.

Increased emphasis is being placed on woodland conservation by detailed planning for watershed protection and flood prevention, by multiple-use of forest lands, and by intensive soil and water conservation practices. Soil Conservation Districts, with technical assistance from the Soil Conservation Service, the South Carolina State Commission of Forestry, and other agencies or individuals, are helping landowners develop complete soil and water conservation programs which include care of woodlands. Forest industries are working effectively with small landowners and on company-owned lands to sustain woodland resources.

This publication, Soil Survey Interpretations For Woodland Conservation, contains information and interpretations of soils and tree growth which will be useful to all individuals interested in woodland resources. There is much more we need to know.

Chas. H. Flory
State Forester

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INTRODUCTION

Soils have many physical and chemical characteristics combining in numerous ways to create three-dimensional soil bodies that form natural patterns in the landscape. No one property nor characteristic has specific value alone; it is the combination of soil properties that is important. For example, the ability of a soil to supply water to trees is related to several properties such as structure, texture, and depth of soil over bedrock or other impervious layers in the soil profile. Combined physical and chemical characteristics of soils are used by soil scientists to identify the different kinds of soils.

Like other higher plants, trees need water, air, nutrients, root space and other site qualities. Different species of trees have different requirements. These requirements are influenced by factors of the environment including the many different kinds of soil on which trees grow. During recent years numerous investigators have related chemical and physical characteristics of soils to tree growth. Some soil characteristics, however, are not easily recognized by most individuals and the utility of such basic research is limited in practical application. However, these results have added much basic information about how soils influence the growth and yield of forests.

Experience has shown that a soil survey provides a satisfactory way to make detailed soil information available for practical application. A soil survey includes a soil map drawn on copies of aerial photographs of the land surface. The map identifies the different kinds of soil and shows the extent of each. Soil interpretations are provided to explain capabilities and limitations in the treatment and use of the soils. Interpretations also describe how well each soil is suited to the production of adapted crops, including woodcrops, and point out special problems to consider in keeping the soils productive.

Since 1937, the Soil Conservation Service, in cooperation with the South Carolina Agricultural Experiment Station, has made soil surveys on 8,700,000 acres in the Coastal Plains of South Carolina. Only 2,400,000 acres of these surveys are of the modern, or standard type. The remaining 6,300,000 acres surveyed earlier used somewhat less detailed procedures and need to be changed to the newer type of surveys to make them most useful. Long range plans include conversion of these older soil surveys into modern form and the completion of surveys for the remaining 30 percent of the Coastal Plains.

Soil-woodland interpretations for the Coastal Plains of South Carolina were assembled from many sources and are summarized in this report. These apply specifically to the modern, or Standard Soil Surveys, but will apply equally well to older surveys when they are converted to Standard Soil Surveys. Capabilities, limitations, and hazards of the soils in woodland use have been assessed, to help in determining proper soil uses and combinations of appropriate conservation treatments. This information is useful to landowners, foresters, engineers, biologists, land managers, agricultural workers, teachers, planning and development boards, appraisers, and to many other individuals. It is basic to the coordinated technical assistance provided by the Soil Conservation Service to landowners in Soil Conservation Districts. This report provides basic information which can be used in preparation of county soil survey reports. It must be recognized that the information presented is the product of joint efforts, judgments, experiences, and field observations, of a large number of local soil scientists and foresters. It represents a summary of the best information currently available. As more information is acquired, improvements and changes may be needed. Similar information is being prepared for the Piedmont (Land Resource Area B-10) and Blue Ridge Mountains (Land Resource Area B-13) and will be published later.

DESCRIPTION OF THE AREA

In this report the Coastal Plain of South Carolina is divided into two major land resource areas, one of which is subdivided (Figure 1): Lower Coastal Plain (A2), Upper and Middle Coastal Plain (A3a), with included Sandhills areas (A3b). Each of these areas is discussed below. Climatic information is presented in Figures 2, 3, 4, and 5. Data on drought in South Carolina was published by van Bavel, et al. (1957) (2).

Lower Coastal Plain (Land Resource Area A2)

The Lower Coastal Plain contains about 6,232,800 acres and extends from the seashore across South Carolina in an irregular-shaped belt 30 to 70 miles wide. Moderately well to poorly drained soils with loamy sand to sandy loam subsoils occupy broad flats and depressions. Some extensive areas of well drained sands and sandy loams are scattered throughout. Large areas of poorly drained soils with clay subsoils occur near the coast. Elevations range from sea level to 100 feet above sea level. Inherent fertility of the soils ranges from low to medium, and organic matter content ranges from low to high. The soils are strongly acid to very strongly acid, except in small local bodies.

Upper and Middle Coastal Plain (Land Resource Area A3a)

The Upper and Middle Coastal Plain (exclusive of the Sandhills area) contains about 3,994,900 acres and extends southwest to northeast across South Carolina in an irregular-shaped belt 10 to 40 miles wide. It lies generally between the Sandhills area on the northwest and the Lower Coastal Plain area on the southeast. Broad areas of well drained soils with sandy loam to sandy clay subsoils occupy rolling topography and slopes in a range from 2 to 6%.

Elevations generally range from 100 feet to 270 feet above sea level. Inherent fertility and organic matter content of the soils are moderate. The soils are strongly acid.

Sandhills (Land Resource Area A3b)

The Sandhills, a portion of the Upper and Middle Coastal Plain, contains about 2,305,500 acres and extends somewhat intermittently across South Carolina adjacent to the "Fall Line" in an irregular-shaped belt 5 to 30 miles wide. Excessively drained sands occur on 2 to 15% slopes and ridges. Well drained to moderately well drained soils with medium to fine textured, slightly compact subsoils occur at the base of slopes, usually on gently sloping topography. Excessively drained soils with fine to coarse, compact subsoils occupy positions where slopes break to streams.

Elevations generally range from 250 to 600 feet above sea level. Inherent fertility and organic matter content of the soils are low. Leaching of plant nutrients is rapid. The soils are strongly acid.

EFFECTS OF PAST LAND-USE ON FORESTS

Early settlers found cypress, blackgum and tupelogum abundant on the very poorly drained swamplands. Sweetgum, white oak, water oak, ash, yellow-poplar, and occasionally, loblolly pine, occupied the better drained areas of the alluvial river bottoms. The same hardwoods competed with loblolly pine on the poorly drained flatwoods of the Coastal Plain. On dry ridges, especially in the Sandhills, longleaf pine was the common species. Bartram, during his travels from 1773-1778, accurately described soils and natural production of the areas now included in the Carolinas, Georgia, and Florida (Van Doren, 1928)(3).

Prior to 1700 indigo and rice were grown in the tidal swamps along the Ashley and Cooper Rivers. Fresh water swamps further inland were soon cleared for these same crops. Indigo production reached a peak about 1775 but practically ceased after the Revolutionary War. The culture of rice continued to flourish and thousands of acres of virgin hardwoods and cypress were cleared to provide land for it. The changing conditions during the Reconstruction Period caused abandonment of most of these lands and excellent stands of hardwoods developed behind the old levees. On better drained lands, loblolly pine was more aggressive but hardwoods gradually began to replace the pine stands.

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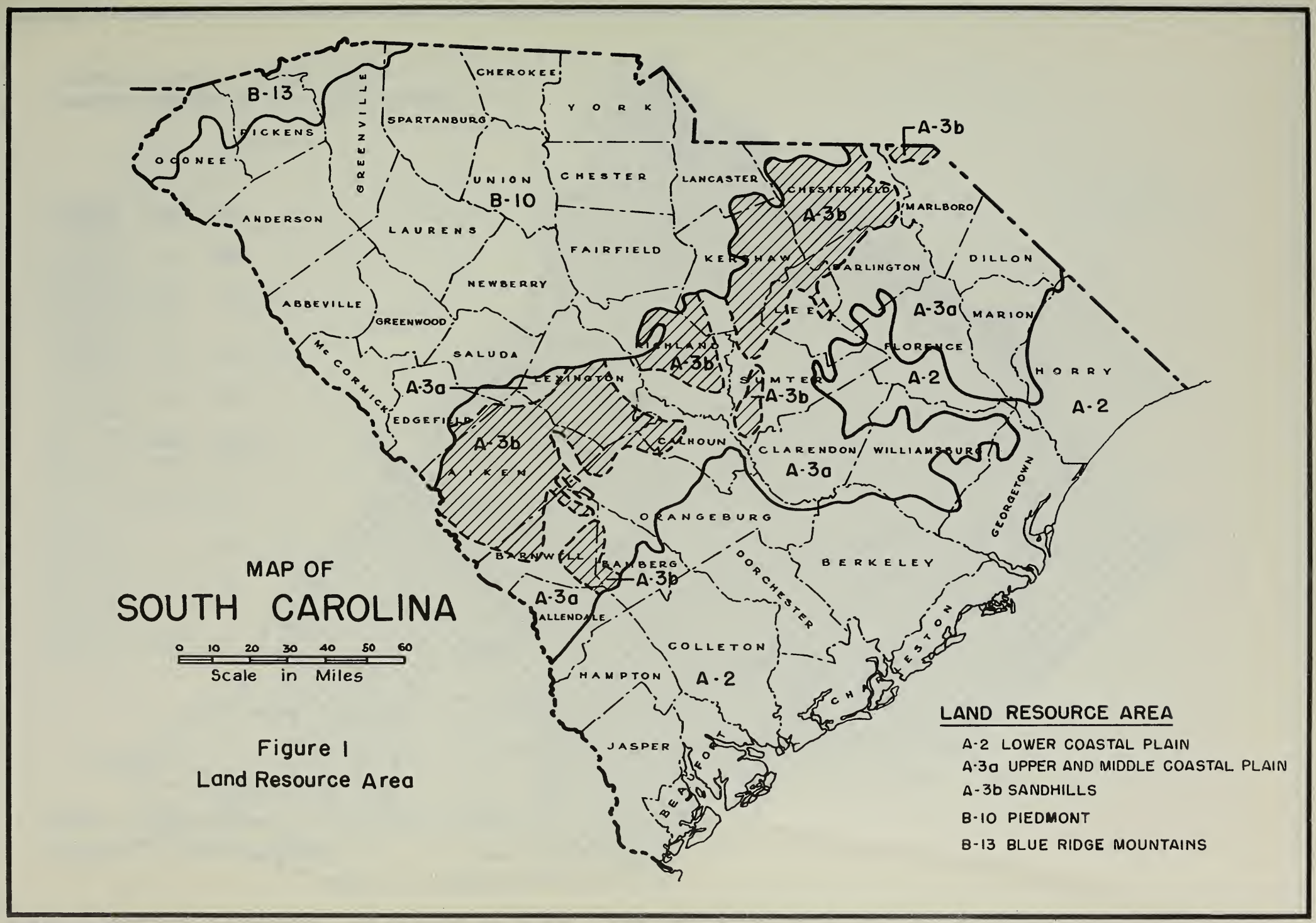

Figure 1
Land Resource Area

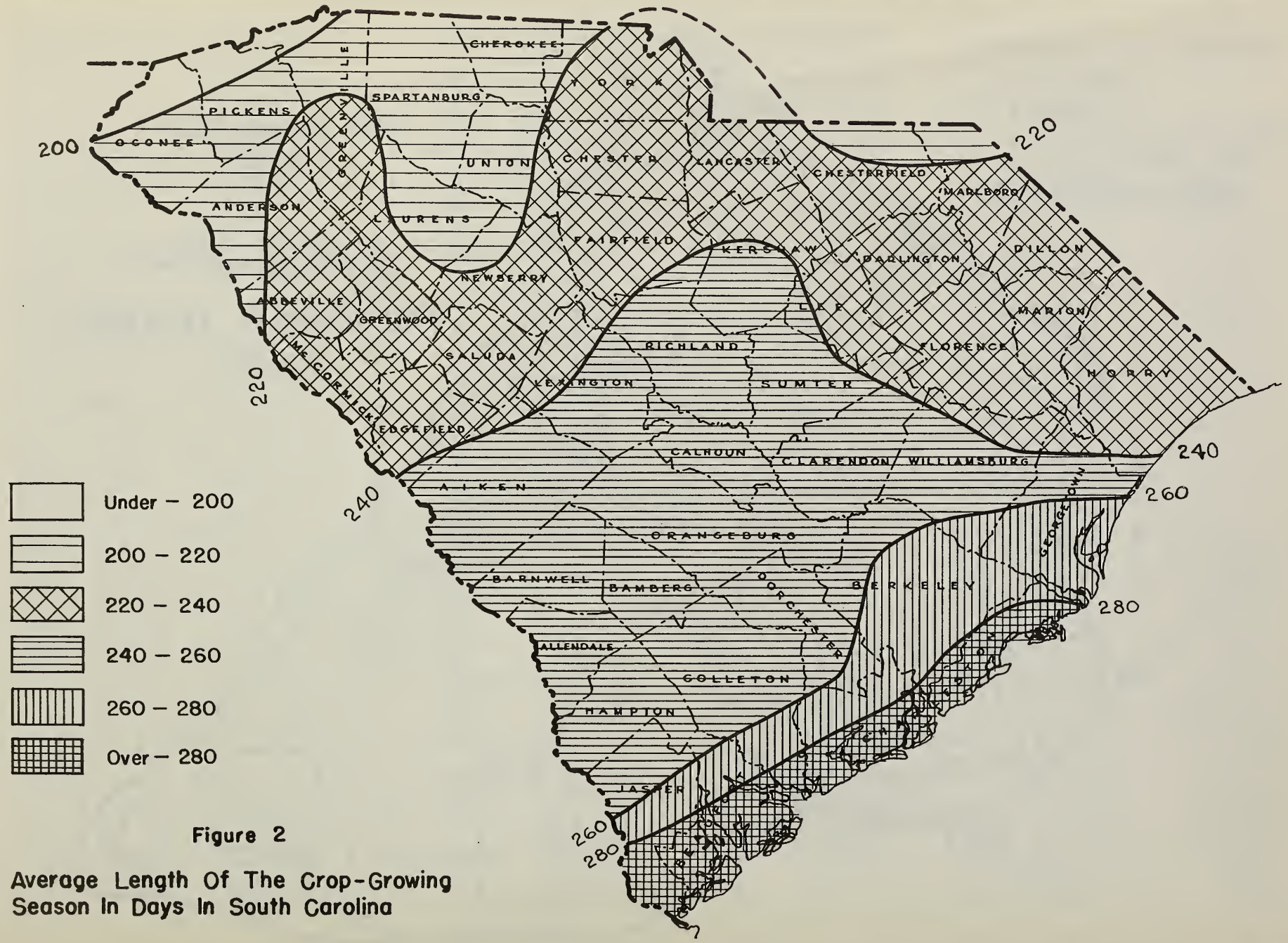

Figure 2

Average Length Of The Crop-Growing Season In Days In South Carolina

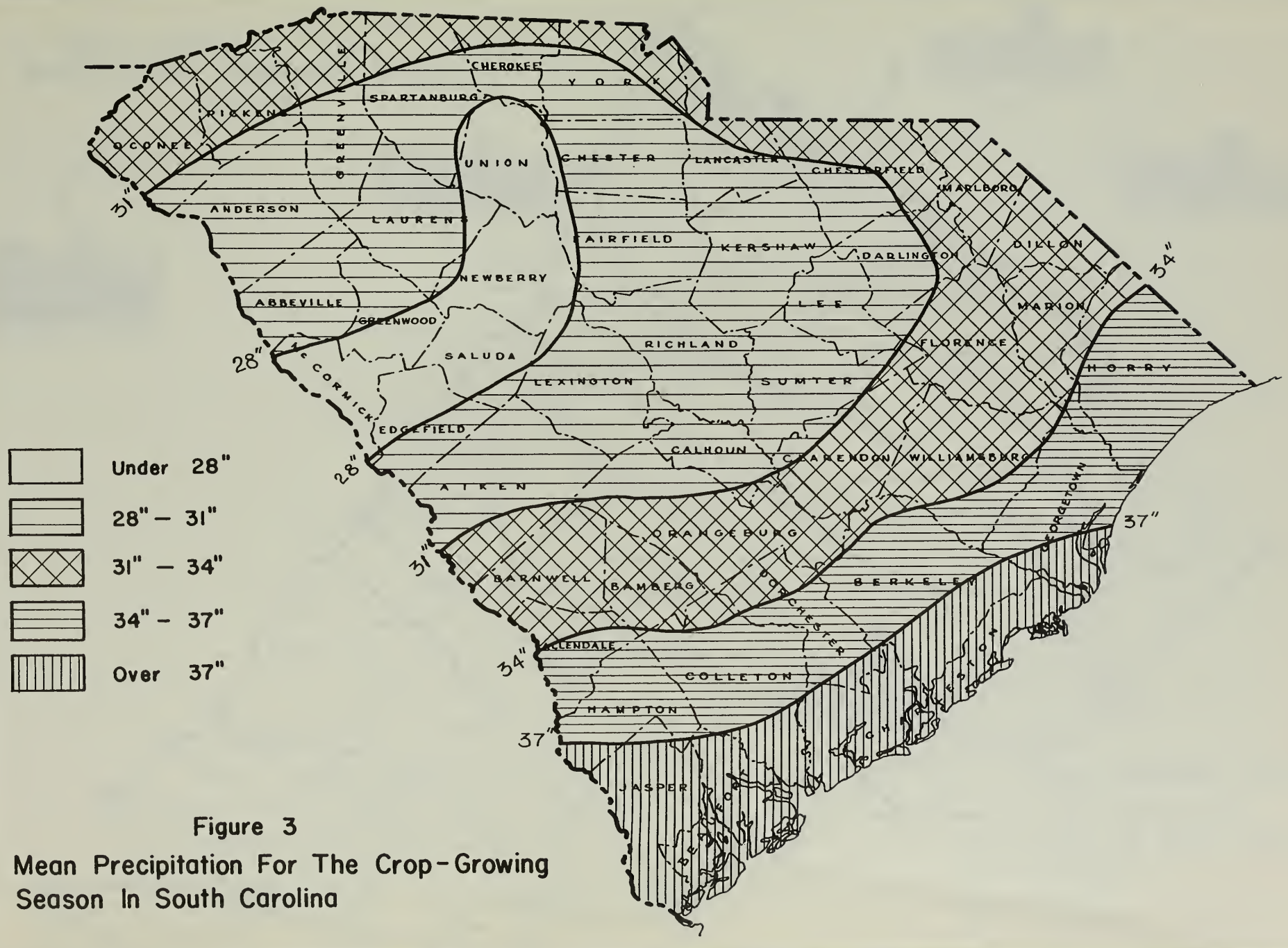

Figure 3
Mean Precipitation For The Crop-Growing Season In South Carolina

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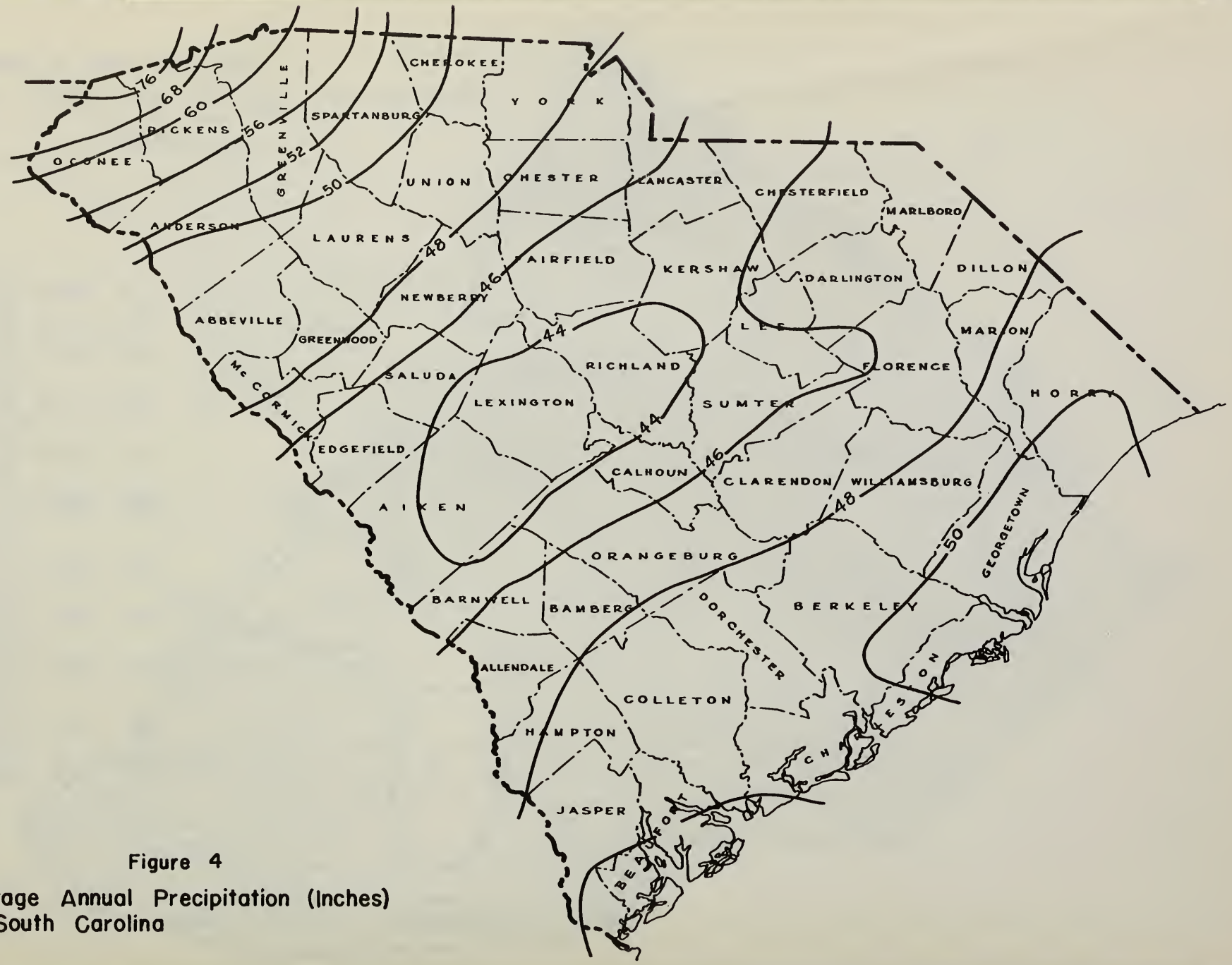

Figure 4

Average Annual Precipitation (Inches) In South Carolina

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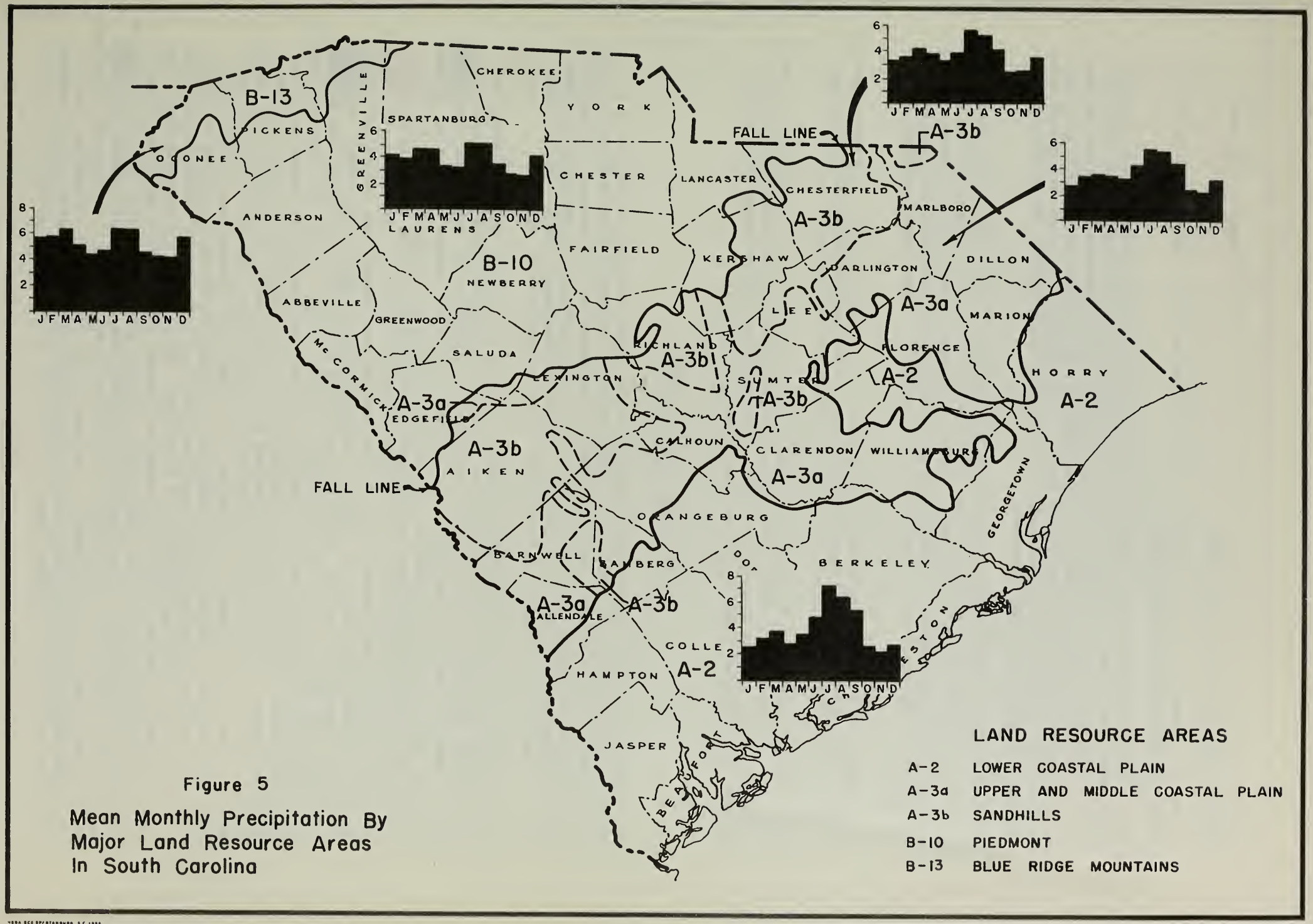

Figure 5

Mean Monthly Precipitation By Major Land Resource Areas In South Carolina

Clearing, cropping, and abandonment, was not as active in the flatwoods of the lower Coastal Plain as in the tidal swamps.

In the upper Coastal Plain and Piedmont, land clearing was well underway by 1770, the height of the tidewater aristocracy.

Small, family-sized farms were common on the better soils where hardwoods grew naturally. These lands were needed for corn and later for cotton. As yields declined or more cultivable area was needed, settlers either cleared new land or abandoned the farm and moved away. The most significant effect of this change in land use was the conversion of most of the original forests to pines, which have a strong tendency to invade and occupy abandoned fields. Pine stands established in fields abandoned during the Reconstruction Period have now been invaded by hardwoods.

Early agriculture bypassed large expanses of longleaf pine in the Coastal Plain and Sandhills. As naval stores became important in the late 1800's heavy losses from "cutting boxes" in trees, fire, and wind breakage occurred in these virgin longleaf stands. Introduction of railroad logging and large band mills hastened the liquidation of stands throughout the Coastal Plains. Loblolly and, occasionally, slash pine, restocked much of the land.

The changing land-use history extended pine into former hardwood sites. In recent years, however, fire protection and heavy cutting of pine from mixed pine-hardwood stands have reversed this trend and speeded up the natural succession of hardwoods.

Major forest types in the Coastal Plain today include longleaf pine, loblolly pine, shortleaf pine, hardwood-pine, oak-hickory, and swamp and bottom-land hardwoods (Figure 6). Detailed descriptions of forest cover types are included in "Forest Cover Types of the Eastern United States" (Society of American Foresters, 1954) (4).

PREVIOUS RELATED WORK

Wilde (1958) (5) stated that an understanding of the forest lay just as much below as above the ground line. His book contains very detailed interpretations of soils in terms of features of forest stands. Wilde's theses on the nature and influences of forest soils describe them as "foundation stones for the new building destined to replace a deteriorating structure of soil-less silviculture". Kramer and Kozlowski (1960) (6) in their book reviewed quite thoroughly the relations of forest soil to site quality.

Turner (1937) (7) related occurrence and rate of growth of loblolly pine and shortleaf pine to soil-topographic characteristics of sites in the coastal plain of Arkansas. Ligon (1939) (8) studied the influences of soil type and other site factors on tree planting for erosion control. Chandler, et al. (1943) (9) showed a marked correlation between soil type and site index of loblolly pine and shortleaf pine. Gaiser (1950) (10) investigated the relationships between soil characteristics and site index of loblolly pine in the Coastal Plain of the Carolinas and Virginia. Coile (1952) (11) correlated site indexes of southern pines in the Coastal Plain on the basis of soil properties, including subsoil texture and consistency, depth to subsoil, surface drainage, depth to mottling, and organic content. Barnes and Ralston (1955) (12) estimated site quality for slash pine by depth to mottling and depth to fine textured horizon. Zahner (1957 a and b) (13) (96) developed a field guide for classifying pine site quality from soil and topographic characteristics. Hansen and McComb (1958) (14) evaluated species-site relations for six conifers and eight broadleaf species. Auten (1958) (15) revised his soil site chart for loblolly pine in the Coastal Plain of South Carolina on the basis of drainage class, texture of subsoil, and depth to subsoil or thickness of A_1 horizon. Row (1960) (16) demonstrated that height growth of slash pine, planted in old fields in the Sandhills of South Carolina and North Carolina, could be estimated (with precautions) from age and two soil variables: depth to a fine textured horizon and thickness of A_1 horizon. McGee (1961) (17) established a similar relationship. McGee (1959) (18), McGee and Bennett (1959a) (94), McGee and Bennett (1959b) (19), and Bennett, et al. (1959) (20) published growth and yield statistics of slash pine planted in old fields in the Sandhills and middle and upper Coastal Plains using soil variables as a basis. Site indexes for the Carolina Sandhills were 1 to 5 points lower than for the middle coastal plain of Georgia. Putnam, et al. (1960) (21) pointed out the relative impermanence of forest types in particular locations. He emphasized that a knowledge of species, rather than of forest types, as related to sites, was fundamental to an under-

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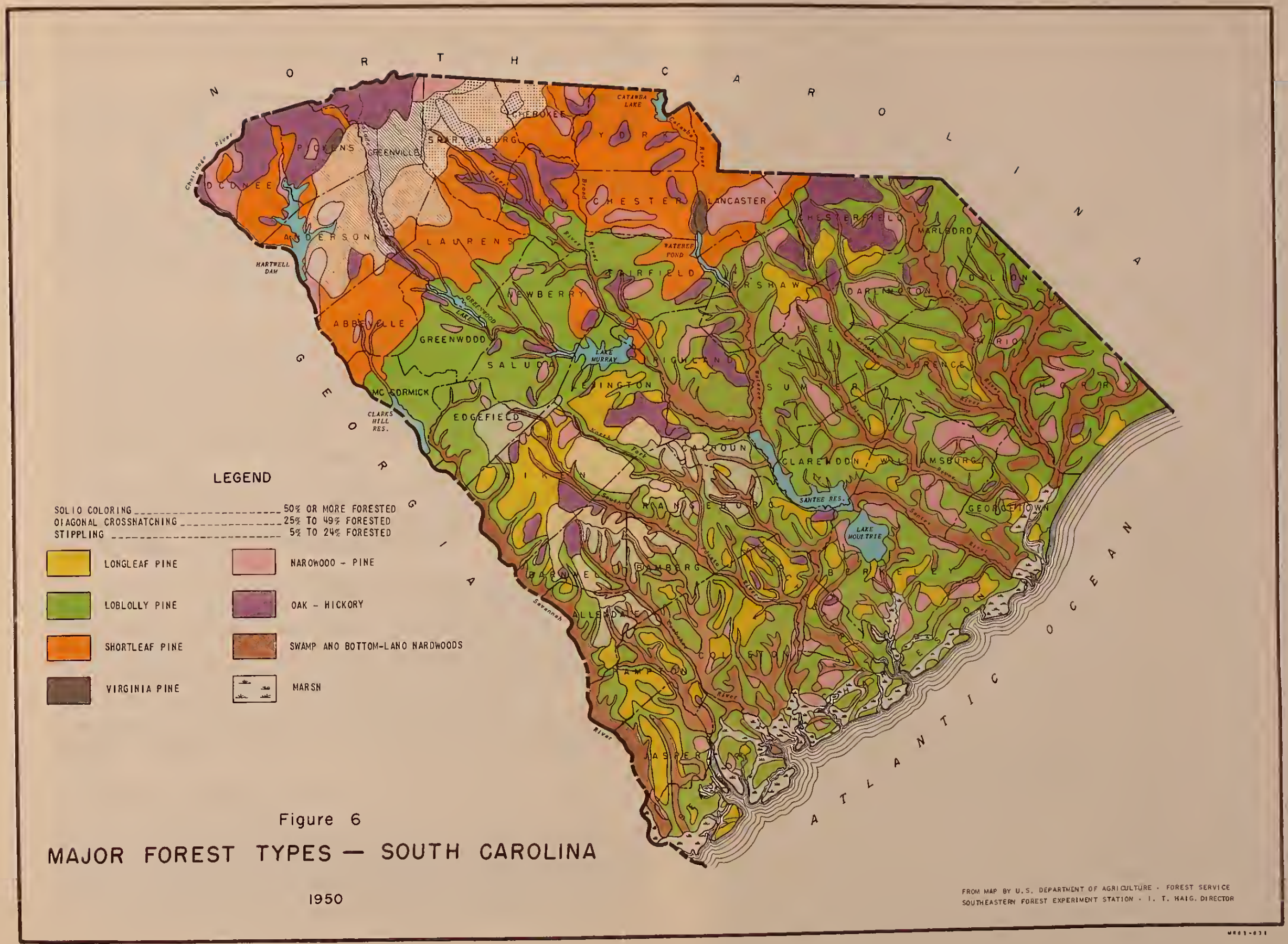

Figure 6

MAJOR FOREST TYPES — SOUTH CAROLINA

1950

standing of forest communities. Wahlenberg (1946) (22) indicated that geologic formations were not sufficiently homogeneous to determine forest type without reference to site and soil. He stated that fire and soil moisture primarily determined the distribution of longleaf pine.

Most of these citations were concerned directly with the determinations of production potential of forest sites. Site quality is the limiting factor frequently in determining and scheduling management operations and techniques. However, there are other soil-woodland relations which affect the ecology, utilization, and management of tree species and it appears appropriate to direct attention to pertinent studies and research.

No attempt was made in the present study to evaluate the effects of climatic variations. The Agricultural Research Service, U. S. Department of Agriculture, (1960) (23) published a map showing areas of winter hardiness for plants of the United States and Canada. McClurkin (1953) (24) correlated site quality of longleaf pine with rainfall and soil characteristics. Wahlenberg and Ostrom (1956) (25) indicated climatic patterns within the range of loblolly pine and Pechanec (1957) (26) reported the effects of temperature and rainfall in limiting the range of loblolly pine. Wells (1939) (27) and Bordeau and Oosting (1959) (28) reported the limiting effects of wind and salt spray on vegetation and suggested that live oak was the salt spray climax in coastal areas. Little, et al. (1958) (29) described salt spray and flooding damage to trees caused by hurricanes.

Plant competition in pine stands and on varied soil conditions was studied by Coile (1950) (30). Korstian and Bilan (1957) (31) indicated that rooting habit and development were involved in relative shade tolerance. Oosting (1942) (32) reported the rate of succession varies with site quality; for example a 34-year-old pine stand on bottomland was at the same stage of succession as a 75-year-old pine stand on upland. Wenger and Trousdell (1957) (33) summarized species competing with pine seedlings in the Coastal Plain. Sweetgum and red maple tended to be more numerous on fine-textured, poorly drained soils; and dogwood, waxmyrtle, and red oaks were more numerous on well drained, sandy loams and loamy sands. They noted that fire increased the growth of hardwood on well drained soil but reduced growth on poorly drained soils. They also noted the effects of soil on seedling growth in unpublished data by Wahlenberg.

Ray (1958) (34) noted the influence of soil types and site index on the effectiveness of control of undesired vegetation by aerial application of herbicides. The study showed control became less effective as site index increased. Control was found to be higher on upper slopes and ridges than on lower slopes and bottomland; and higher on south and west exposures than on north and east exposures. Soil type appeared to affect the length of time-interval before respraying to get desirable control.

Lotti, et al. (1960) (35) used prescribed burning for 10 years to control understory hardwoods and prepare seedbeds on Coxville fine sandy loam without evidence of serious fire damage to the soil. Organic matter in the upper 2 inches of the soil increased as a result of annual burning. Heyward and Barnette (1934) (36) reported that burning released mineral nutrients, increased the amount of nitrogen, and lowered the acidity of the surface soil. The difference in the response of hardwood cover to certain soil conditions in the absence of fire and following burning was noted by Wenger and Trousdell (1957) (33). Wahlenberg (1946) (22) pointed out that type of soil and drainage affected seed yields; and that satisfactory soil surface conditions and soil productivity could be maintained with moderate burning suited to the culture of longleaf pine.

Zahner (1954) (37) attributed failures in pine plantations to site differences in soil and topography and concluded that moisture and aeration were important factors in seedling mortality. He prepared a planting risk chart based on topographic position and soil properties.

Smith (1960) (38) compared growth of seedlings of slash pine planted on Orangeburg, Norfolk, Johnston, and Plummer soil series.

Preliminary studies at the Southeastern Tidewater Experiment Station showed seedlings of slash pine and loblolly pine to be extremely tolerant of poor drainage and flooding but suggested that slash pine might benefit from drainage more than loblolly pine (unpublished lished). Louistalot (1945) (39) observed that flooding of trees reduced photosynthesis tremendously; the reduction was more severe where trees were growing in finer textured soils than when growing in sand. Olson, et al. (1954) (40) demonstrated that slash pine could be established successfully in cypress ponds following drainage. Miller and Maki

(1957) (41) reported growth of planted slash and loblolly pines on drained areas to be about 14 times that from non-drained sites on the same soil type. Graham and Rebuck (1958) (42) demonstrated that growth of pond pine *(Pinus rigida serotina)* on a drained site was nearly double the growth on a poorly drained site. Schlaudt (1959) (43) and Wiley (1959) (44) described water management in excessively wet soils to establish desired species or to facilitate management and harvesting operations. Anderson (1961) (45) stated that accessibility, or the difficulty of logging chance, might significantly affect stumpage prices; he suggested that the difficulty of reaching and working Coastal stands might contribute to the lower stumpage prices which existed in these areas.

Garland, Pierce, and Trimble (1959) (46) demonstrated that detailed soil surveys on woodlands can be adapted for specific needs and management objectives.

Reynolds (1956) (47) stated that conservation of soil moisture through forest stand management might be more important than the silvicultural system employed. He demonstrated how available water supply could be conserved through management techniques, to increase growth of desirable trees. Zahner (1956) (48) devised a method to measure soil moisture deficiencies and recommended control of basal area, eradication of underbrush, and removal of cull trees in stand management, to minimize the effects of water deficiency.

Lehocky and Lee (1954) (49) reported successful reclamation of scrub oak lands in the Sandhills of South Carolina.

Hebb (1957) (50) described the need for drastic site preparation to remove scrub oaks and wiregrass, vigorous competitors for soil moisture in the Sandhills. Koshi (1959) (51) found grass or tree vegetation could withdraw all available moisture from the upper 24 inches of the soil profile. Woods, et al. (1959) (52) described soil moisture as the limiting factor in establishing seedlings in the Sandhills and stated that competing vegetation should be eradicated to establish pines successfully. Shipman (1956) (53), (1958) (54) demonstrated that pines could be planted successfully in the Sandhills following furrowing or when sites were properly prepared and high quality seedlings were used. Wakely (1935) (55) developed seedling grades for pine planting stock and described site preparation and planting techniques for varied soil conditions. Hatcher (1957) (56) employed similar seedling grades in developing a "prescription" for planting pines in old fields according to expected survival by soil types, seedling grade, and site treatment. Kalmar (1958) (57) discussed site preparation as related to economics of intensive management. Heat injury from high surface temperatures as a major cause of mortality of seedlings of sand pine was reported by Cooper (1957). (58) Scheer and Hodges (1960) (59) observed the ability of sand pine to compete successfully with scrub oaks and wiregrass in the sandhills of Florida.

Insect infestations have been associated with soil types characterized by shallow rooting zones, poor drainage, and unfavorable moisture supply, Thatcher (1960) (60). He described these soils as having gumbo or clay subsoil or being shallow soils overlying limestone or solid clay hardpans. He also pointed out that fires appeared to be particularly harmful where tree roots were near the surface. Wakeley (1935) (55) noted that infestations by Nantucket pine tip moth *(Rhyacionia frustrana,* Comst.*)* were very severe on soils not especially adapted to loblolly and shortleaf pine. He described nematode infestations in old fields and on sandy soils. Soil fungi and parasites of primary importance to forest nursery managers are described by Foster (1959) (61).

Tedrow (1952) (62) suggested that toxic concentrations of soluble aluminum were significant in the growth of pitch pine *(Pinus rigida,* Mill.*)* However, Andresen (1959) (63) stated that soluble aluminum was not lethal even in very high concentrations; that it had no apparent influence in depressing growth; and classed *Pinus rigida* as an aluminum accumulator.

Croker (1958) (64) observed windthrow of longleaf pine as related to soil depth to clay or sandy clay. Grano (1953) (65) observed that windthrow of shortleaf pine was greater than that of loblolly pine on a silt loam soil.

Lull (1959) (66) reviewed soil compaction as related to soil and water conservation.

Ferber, et al. (1955) (67) and Ferber (1958) (68) evaluated the effects of windbreaks in soil and water conservation and emphasized proper selection of trees and shrubs to fit soil conditions and purpose of growing windbreaks.

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The suitability of native plants for erosion control and wildlife were described in detail by Van Dersal (1938) (69) and Graham (1941) (70). Reid and Goodrum (1957) (71) emphasized the importance of oaks and pines to wildlife. Finley (1961) (72) suggested that acorn crops might be influenced by soil conditions. Bateman (1959 a and b) (73) (74) made recommendations for increasing game population on woodlands without undue sacrifice of wood production. Davison and Neeley (1959) (75) encouraged flooding of woodlands to attract ducks. Broadfoot (1960) (76) observed that shallow water impoundments increased the amount of water stored in the soil, benefited tree growth, and did not damage trees when drained promptly in the spring.

Halls, et al. (1957) (77) described and assayed mineral and chemical composition of species browsed by cattle. Williams, et al. (1955) (78) described the extent, grazing capacities, and special problems of nine broad range types of the South. Campbell, et al. (1954) (79) evaluated the nutrient content of forage species as effected by timber type, burning, grazing, and fertilizing.

Wilde (1958) (80), (1961) (81) discussed nutrition and the correction of deficiencies as related to forest soil conditions. McGregor (1957) (82) reported increased growth of slash pine following fertilization on Leon and Rex soils. Abstracts and discussions concerning the treatment of many kinds of forest trees in relation to sites, soils, and water supply were published by the American Potash Institute (1958) (83) and Duke University (1959) (84).

Volume, yield and stand tables for second-growth southern pines were published by the U. S. Department of Agriculture (1929) (85). Additional information was published by MacKinney and Chaiken (1939) (86), Slocum and Miller (1935) (87), Pechanec (1960) (88) and Schumacher and Coile (1960) (89). Broadfoot (1961) (90) described quality, yield, and site index on soils with more than 6 inches of topsoil as being superior to that on eroded soils.

COLLECTION OF INFORMATION

Field studies of soils and tree growth were begun by the Soil Conservation Service in 1955 and are continuing. The South Carolina State Commission of Forestry assisted in collecting data in 1958 and 1959. Soil scientists and foresters worked together to locate plots, make observations, and record data.

In the Coastal Plains 1,081 locations were studied. Eleven species or woodcrops were sampled: loblolly pine-562 plots; longleaf pine-354; shortleaf pine-55; slash pine-16; and pond pine-59. Thirty-four plots of six other species were measured but they are not summarized in this report. Plot locations were posted for permanent reference on county highway maps which are on file in the Soil Conservation Service State Office at Columbia, South Carolina. The general distribution of sampling is shown in Figure 7.

Soils were examined and classified, and soil profiles were described according to standard procedures outlined in the Soil Survey Manual, Soil Survey Staff (1951) (95). General physiographic information such as relief, functional plot position, etc., were noted. All records were made on especially designed forms to accumulate both soil and plant information. Only dominant and co-dominant trees were selected for measurement. To qualify, these trees were required to exhibit evidence of unrestricted height growth from youth. Trees measured were from 30 to 70 years of age, free from disease and injury, in well stocked, even-aged, natural, essentially unmanaged stands within specified stand density ranges. Total height was measured, using the Abney hand level and 100-foot tape. Total age was determined by counting annual rings on increment cores from borings at breast height, and adding three years to the ring count for loblolly, shortleaf, slash, and pond pines, and 7 years to the ring count for longleaf pine. For some trees, merchantable height and diameter at breast height were determined and recorded. Site index was determined by using published site index curves (U. S. Department of Agriculture, 1929) (85). Revised curves by Coile and Schumacher (1953) (93), and Schumacher and Coile (1960) (89) were used for loblolly pine and pond pine.

Individual plot data are summarized in Appendix Tables 1, 2, and 3. The original field record sheets are on file in the Soil Conservation Service State Office.

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ANALYSES OF DATA AND INTERPRETATION

Soil mapping units which delineate phases of soil types (including slope and erosion classes) provide the most accurate basis for relating tree growth and conservation needs to different kinds of soil. Phases are more narrowly defined than soil series and types. Phases help to define more narrowly soil characteristics not shown by series or type alone. The phase of a soil type used in standard soil surveys is the unit about which the greatest number of precise statements and predictions can be made concerning soil use, management, and productivity, Soil Survey Staff (1951) (95). The interpretations presented in this report were summarized by individual soil mapping units that have been used in soil surveys of the Coastal Plains.

Each soil mapping unit is characterized by its productive potential for each different kind of woodcrop, Lemmon (1958) (91), under a specified kind of management. This is customarily done by determining the average site index of qualifying sample woodcrops growing on each soil. Site index is defined in this report as the average total height of the dominant and co-dominant trees in well-stocked, unmanaged stands at 50 years of age. It is obtained by plotting total height and ages of trees measured on published site index curves and assigning the site index values represented by the plotted points. Site index classes have been correlated with measured volume growth and yield per acre for many of our valuable woodcrops, U. S. Department of Agriculture (1929) (85), Schumacher and Coile (1960) (89), and others. The information is useful as an indication of potential soil productivity and is available from this published research when soil-site index correlations are determined by simple field measurements as summarized in this report. Appendix Table 5 and Appendix Figure 1 are provided so that average site index values for the different soils and woodcrops may be translated into potential growth and yield. Readers are referred to Schumacher and Coile (1960) (89) for comparable information on pond pine.

It was not possible to sample every soil mapping unit for each of the woodcrops reported. In some cases, usable site index values were supplied by analogy based on measurements of other species or on measurements on other soils of similar physical characteristics.

Supplied values are clearly marked in Tables 1, 3, and 5 where a summary of average site index by soil mapping units and woodcrops is presented for the three resource areas reported.

Potential soil productivity (site index) is not the only interpretation needed to use intelligently detailed soil information in forestry. Certain soil-related hazards and limitations must also be considered. Several of these have been identified and described, and criteria have been set up as a basis for rating each mapping unit. Ratings have been made in such a way as to indicate the relative degree of the hazard or limitation and to point out conservation treatments that should be considered. Soil-related items discussed below are: plant competition; seedling mortality; equipment limitations; windthrow hazards; and erosion hazards. Certain other hazards from forest pests and disease, and the production of special woodland products on some of the soils, are discussed in later sections of this report where each woodland suitability group of soils is discussed.

Plant Competition

This item refers to the degree of competition afforded by undesirable species and the rate at which they invade, or develop on different soils (brush encroachment) when openings are made in the canopy such as for regeneration purposes. It assumes the presence of commonly associated species that may be expected in well-stocked stands on the soils and assumes the climatic condition to be normal. Ratings of slight, moderate, or severe were made for each soil mapping unit. Each rating was associated with possible treatment needed to obtain adequate restocking and growth of a desired tree species. In general, it assessed each soil as to the range of adapted species that could offer competition, although in some cases severe competion could be the result of adaptation for only a few exceptionally competitive species.

Seedling Mortality (Regeneration Potential)

This item refers to the expected degree of mortality of naturally occurring or planted tree seedlings as influenced by kinds of soil. When evaluating seedling mortality, plant competition is assumed not to be a limiting factor. For plantations, it assumes use of healthy planting stock of proper grade and proper planting. For naturally occurring seed-

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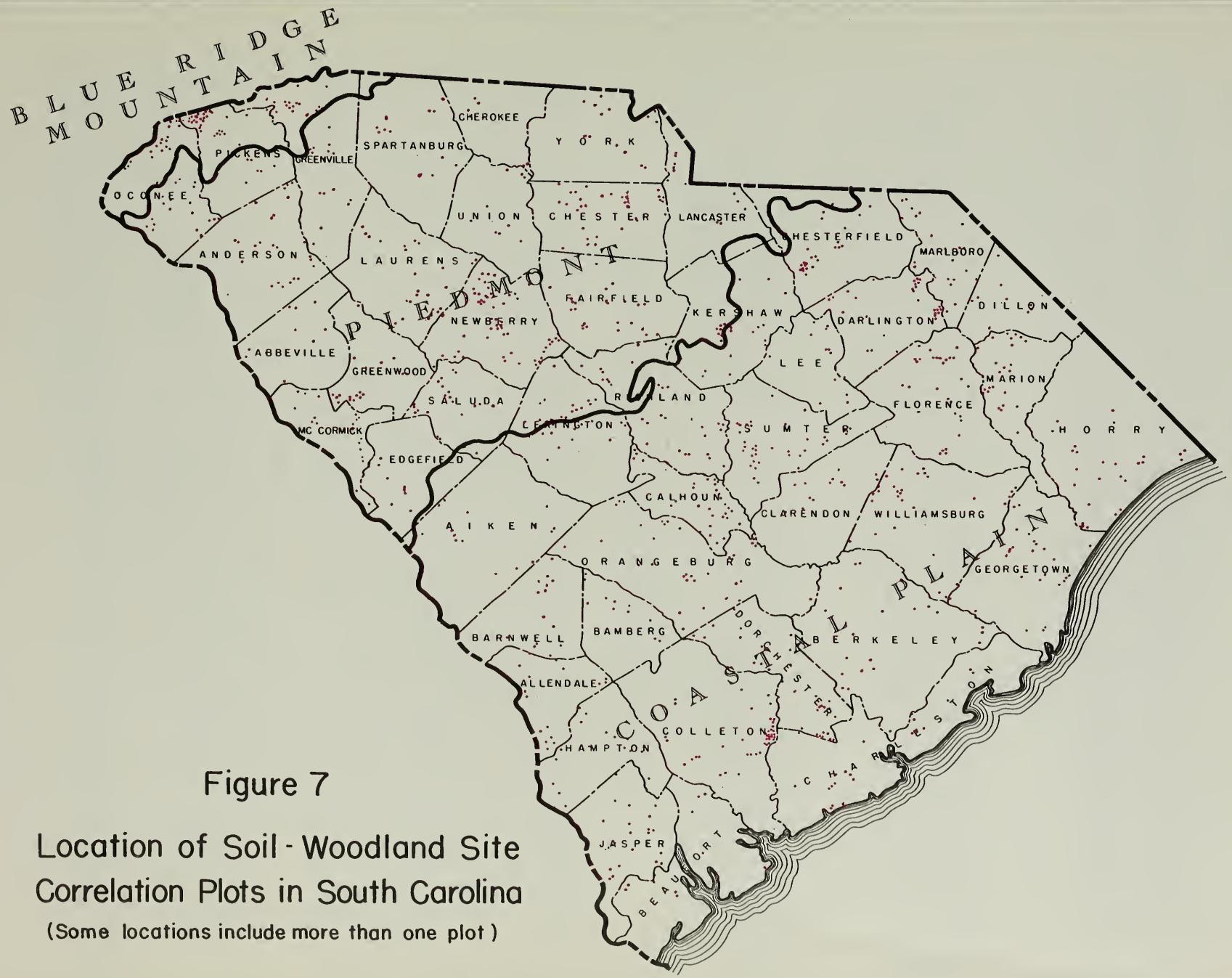

Figure 7

Location of Soil - Woodland Site Correlation Plots in South Carolina

(Some locations include more than one plot)

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lings it assumes an adequate seed supply. For both natural and planted seedlings normal environmental factors are assumed. Each soil unit was rated slight, moderate, or severe, on the basis of its receptivity to regeneration under the assumed condition. These ratings were developed on the basis of experience and knowledge of the soils and of the woodlands in an area and reflect the treatments that need to be considered to obtain adequate regeneration.

Equipment Limitation

This item includes those soil characteristics and topographic features that restrict or prohibit trafficability or the use of equipment in crop tending or tree harvesting. Knowledge of these factors may result in different recommendations for kinds of equipment, method of operation, or seasons of use, on various soils. Differences may be due to soil characteristics, stones, drainage, slope, or other factors normally used in establishing mapping units. Problems may be seasonal or yearlong. Ratings of slight, moderate, or severe were made for each soil mapping unit.

Windthrow Hazard

This item is an evaluation of soil characteristics that control tree-root development effecting wind firmness. Information was provided by field observations of wind damage to stands of varying densities on different soils. This evaluation is important in making recommendations by soils for stand density control in thinnings, release cuttings, regeneration, and final harvest cuttings. Each soil unit was rated slight, moderate or severe, depending upon the expected degree of this hazard.

Erosion Hazard

This item indicates the potential erosion hazard of the soil when common forest management and utilization are applied. This evaluation is important in selecting species and special techniques, site preparation, and construction of roads, trails, firebreaks, and landings. Each soil unit was rated slight, moderate, or severe depending upon the expected degree of this hazard.

WOODLAND SUITABILITY GROUPINGS OF SOILS

There is a large number of soils in the Coastal Plain. They are not all significantly different from one another with respect to woodland uses. Groupings have, therefore, been made, based on average site index information and on ratings of hazards and limitations in woodland use, to simplify the presentation and use of soil information. These are called Woodland Suitability Groupings of soils and they are summarized in Tables 2, 4, and 6 for comparison. Woodland Suitability Groups may be said to contain soils that produce similar kinds of woodcrops, or other related values, with similar management practices. They require similar kinds of conservation treatments, and have comparable potential productivity. Each group is discussed in narrative form where a complete listing of the soils included therein is given. These narratives represent useful guides in: (1) determining species and woodcrops best suited to the soil and the purpose of management, (2) selecting silvicultural and other treatments to utilize safely the potentials of each soil, and (3) making economic evaluations and decisions which permit greatest returns from woodlands.

Lower Coastal Plain (Land Resource Area A2)

Average site indexes by soil mapping units in the Lower Coastal Plain are included in Table 1. The number of site measurements used to arrive at these average site index values is shown, together with the calculated standard deviation where three or more measurements were available. The woodland suitability group to which each soil was assigned for interpretations is also indicated.

Table 2 is a summary of woodland suitability groupings of soils and their interpretations for woodland uses in the Lower Coastal Plain. Detailed interpretations for each of the woodland suitability groups follow.

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TABLE 1. Average Site Indexes (at 50 years) for Five Southern Pines by Soil Mapping Units in the Lower Coastal Plain of South Carolina (Land Resource Area A2) [1]

SOIL MAPPING UNITS			AVERAGE SITE INDEX [5]					WOODLAND SUITABILITY GROUP [6]
SOIL SERIES, TYPE, AND PHASE [2]	SLOPE CLASSES [3]	EROSION CLASSES [4]	LOBLOLLY PINE	LONGLEAF PINE	SHORTLEAF PINE	SLASH PINE	POND PINE	
Bayboro loam	A	1	103±7 (4)	–	–	106 (1)	–	19
Bladen fine sandy loam and sandy loam	A	1	96±1 (3)	–	–	–	–	16
Bladen fine sandy loam, phosphatic ***	A	1	108±6 (9)	–	–	–	–	22
Bladen loam	A	1	98 (2)	–	85 (1)	–	–	16
Bladen silty clay loam, sandy clay loam, and sandy loam	A	1	91±3 (12)	–	–	–	–	16
Bladen silty clay loam, phosphatic ***	A	1	106±8 (12)	–	–	–	–	22
Blanton fine sand	A, B**	1	73±8 (3)	72±3 (3)	–	–	–	1
Caroline fine sandy loam	A, B	1	79±8 (3)	68 (1)	69 (1)	–	–	4
Caroline fine sandy loam, thick surface	B	1	75*	76 (1)	79 (1)	–	–	4
Caroline clay loam	B, C	3	68 (1)	–	–	–	–	4
Charleston fine sandy loam	A	1	90*	67 (1)	85 (1)	90*	67 (1)	6
Charleston fine sandy loam,phosphatic***	A	1	96 (1)	–	–	–	–	22
Chewacla fine sandy loam and silt loam	A	1	95±8 (3)	–	–	–	–	13
Congaree silt loam	A	1	114 (2)	–	–	–	–	8
Coxville fine sandy loam	A	1	90±3 (13)	72±6 (8)	70 (1)	98 (1)	–	15
Coxville loam and silt loam	A	1	88±3 (8)	73±6 (3)	–	100 (1)	72 (2)	15
Coxville clay loam	A	1	95 (1)	–	–	–	–	15
Craven sandy loam and fine sandy loam	A, B	1	83±4 (7)	67±2 (5)	66 (2)	–	–	5
Dunbar sandy loam and fine sandy loam	A	1	89±3 (3)	78 (2)	60 (1)	–	72 (1)	5
Edisto sandy loam, phosphatic ***	A	1	96 (2)	–	–	–	–	22
Edisto fine sandy loam and sandy loam	A	1	92±5 (16)	76 (2)	–	–	72 (1)	9
Edisto fine sandy loam, phosphatic ***	A	1	106±5 (5)	–	–	–	–	22
Eulonia sandy loam and fine sandy loam	A, B	1	86±7 (10)	76±4 (4)	75±12 (4)	–	–	5
Eulonia fine sandy loam, phosphatic ***	A, B	1	103±9 (7)	77 (1)	–	–	–	22
Eulonia loamy fine sand, thick surface	A, B	1	81±6 (7)	72 (1)	79±7 (3)	–	–	5
Eustis fine sand	A, B**	1	85 (2)	–	–	–	–	1
Fairhope fine sandy loam	A, B, C	1	83±8 (5)	–	72±4 (4)	–	–	5
Flint very fine sandy loam	A	1	91 (2)	–	–	–	–	7
Goldsboro sandy loam	A	1	93 (1)	71±5 (5)	–	–	–	6
Goldsboro fine sandy loam	A	1	91±9 (5)	76±7 (4)	–	–	–	6
Goldsboro loamy sand, sandy substratum	A	1	90*	72 (1)	–	–	–	12
Hyde loam	A	1	97 (1)	–	–	–	–	19
Hyde clay loam, phosphatic ***	A	1	105 (1)	–	–	–	–	22
Izagora sandy loam	A	1	80*	61 (1)	–	–	–	10
Kalmia sandy loam and fine sandy loam	A	1	78 (2)	–	–	–	–	4
Kiawah loamy fine sand	A	1	79±3 (3)	66±4 (5)	–	–	60 (2)	12
Klej loamy sand and Klej loamy sand, somewhat poorly drained	A	1	79±9 (3)	63±4 (7)	–	–	64±2 (5)	12
Klej loamy fine sand	A	1	78 (2)	67±4 (10)	65 (1)	–	–	12
Klej sand, shallow	A, B	1	71±7 (7)	67±6 (5)	–	–	75 (1)	12

TABLE 1. Average Site Indexes (at 50 years) for Five Southern Pines by Soil Mapping Units in the Lower Coastal Plain of South Carolina (Land Resource Area A2) [1]

SOIL MAPPING UNITS			AVERAGE SITE INDEX [5]					WOODLAND SUITABILITY GROUP [6]
SOIL SERIES, TYPE, AND PHASE [2]	SLOPE CLASSES [3]	EROSION CLASSES [4]	LOBLOLLY PINE	LONGLEAF PINE	SHORTLEAF PINE	SLASH PINE	POND PINE	
Lakeland sand	A, B, C**	1	71±7 (10)	67±6 (6)	68 (1)	-	-	1
Lakeland sand, shallow	A, B, C	1	90±2 (4)	70±4 (3)	-	82 (1)	-	2
Lakeland sand, terrace	A, B**	1	85 (2)	-	-	-	-	2
Lakeland loamy sand, shallow, terrace	A, B	1	90*	82 (1)	-	-	-	2
Leaf very fine sandy loam and silt loam	A	1	92 (2)	-	-	-	-	15
Lenoir fine sandy loam	A	1	87 (1)	-	77 (1)	-	-	11
Leon fine sand	A	1	71 (1)	59±6 (3)	-	-	60 (1)	20
Lynchburg sandy loam	A	1	86±1 (3)	70±4 (4)	-	86*	70 (1)	10
Lynchburg fine sandy loam	A	1	82±4 (5)	69±5 (15)	-	87 (1)	65±5 (3)	10
Marlboro fine sandy loam	A	1	90*	-	62 (1)	-	-	4
Meggett fine sandy loam and loam	A	1	107±8 (3)	-	-	-	-	22
Meggett clay loam	A	1	99 (2)	-	-	-	-	22
Myatt sandy loam and fine sandy loam	A	1	97±10 (3)	71 (1)	-	-	90 (1)	17
Norfolk sandy loam	A, B	1	83 (1)	70 (1)	68 (1)	-	-	4
Norfolk loamy sand, thick surface	A, B	1	74 (2)	69±2 (4)	-	-	-	4
Ona loamy sand and sand	A	1	70±9 (4)	66±1 (4)	-	-	68 (2)	12
Onslow sandy loam and fine sandy loam	A	1	77±3 (3)	67±2 (3)	-	67 (1)	76 (2)	6
Portsmouth sandy loam, fine sandy loam, and loam	A	1	101±5 (14)	-	-	91 (2)	73±7 (8)	17
Plummer sand and loamy fine sand	A	1	94±7 (3)	63±3 (3)	-	-	78 (2)	14
Plummer sand, terrace	A	1	80 (1)	-	-	-	-	14
Rains sandy loam and fine sandy loam	A	1	98±2 (4)	-	-	90 (2)	70 (1)	15
Rutlege loamy sand and Rutlege loamy sand, poorly drained	A	1	97±3 (3)	64 (1)	-	-	70 (2)	18
Rutlege loamy fine sand	A	1	87±4 (5)	73±4 (3)	-	86 (2)	68 (1)	18
Seabrook loamy fine sand	A	1	87±4 (4)	69±4 (3)	-	-	-	6
Stono fine sandy loam	A	1	95*	-	-	-	-	17
Stono fine sandy loam, phosphatic ***	A	1	105 (1)	-	-	-	-	22
Stono fine sandy loam, thick surface, phosphatic ***	A	1	108 (1)	-	-	-	-	22
St. Johns sand and loamy fine sand	A	1	66 (1)	54±4 (3)	-	-	55±5 (3)	20
St. Lucie sand	A, B**	1	60 (2)	35 (1)	-	-	-	3
Wahee fine sandy loam and silt loam	A	1	91 (1)	-	-	-	-	7
Wando sand and fine sand	A, B, C**	1	74±9 (5)	70±1 (4)	66 (2)	77 (1)	-	1
Wando sand, shallow	A	1	91 (2)	-	79 (1)	-	-	2
Wehadkee silt loam	A	1	100*	-	-	-	-	21
Weston fine sandy loam	A	1	90±5 (17)	68±4 (7)	-	-	-	9
Weston fine sandy loam, phosphatic ***	A	1	107±8 (24)	-	-	-	-	22
Weston fine sandy loam, thick surface, phosphatic ***	A	1	105 (2)	-	-	-	-	22

(See page 20 for footnotes)

1| Data summarized from Appendix Table 1.

2| Where evidence supported it, certain soil types and phases within soil series were combined for this summary.

3| Slope classes:

**	A	0 to 2% slopes, nearly level
**	B	2 to 6% slopes, gently sloping
	C	6 to 10% slopes, sloping
	D	10 to 15% slopes, strongly sloping
	E	15 to 25% slopes, moderately steep
	F	25% and over, steep

4| Erosion classes:

1. None to slight; 75% or more of original surface soil or plow layer (in soils having thin surfaces) remaining.
2. Moderate; approximately 25% to 75% of the original A horizon or surface soil remaining.
3. Severe; more than 75% of the original plow layer or A horizon and up to 25% of the subsoil lost.
4. Moderately gullied; soils have moderately deep or deep gullies occupying 15 to 40% of the area. Area between gullies may have Class 1, 2, or 3 erosion.

5| The average site index value is followed by a plus or minus standard deviation. These were calculated wherever three or more measurements were available.
A dash indicates that the species does not generally occur on the soil or that data are not available.

6| Numbers in this column refer to the woodland suitability group into which the soil was placed.

* The numbers in parentheses indicate the number of measurements available for each soil.

** Slope classes marked by a double asterisk are on well drained sands on which the A and B slopes are combined in mapping thus forming a B slope of 0 to 6%.

*** Soils marked by a triple asterisk have not been recognized previously in soil mapping. The presence of available phosphate must be determined on these soils to interpret properly soil-woodland relationships. Phosphatic phases are confined generally to areas of phosphatic marl deposits shown by Rogers (1914) (97).

TABLE 2 - WOODLAND SUITABILITY GROUPINGS OF SOILS WITH INTERPRETATIONS FOR MANAGEMENT AND TREATMENT - LOWER COASTAL PLAIN OF SOUTH CAROLINA (LAND RESOURCE AREA A2

GROUP NO.	SOIL MAPPING UNIT		POTENTIAL SOIL PRODUCTIVITY - SITE INDEX AT 50 YEARS 2/					INTERPRETATIONS FOR WOODLAND CONSERVATION 3/					SUITABLE WOODCROPS
	SOIL SERIES, TYPE, AND PHASE	SLOPE AND EROSION CLASSES 1/	LOBLOLLY PINE	LONGLEAF PINE	SHORTLEAF PINE	SLASH PINE	POND PINE	PLANT COMPETITION	SEEDLING MORTALITY	EQUIPMENT LIMITATION	WINDTHROW HAZARD	EROSION HAZARD	
1	Blanton fine sand Eustis fine sand Lakeland sand Wando sand and fine sand	B1 B1 B1, C1 B1	74±4 (27)	69±4 (13)	64±6 (4)	77- (1)	-	Severe	Moderate	Slight	Slight	Slight	Pines
2	Lakeland sand, shallow Lakeland sand, terrace Lakeland loamy sand, shallow, terrace Wando sand, shallow	B1 A1, B1 B1, C1 A1	89±3 (8)	74±7 (4)	79- (1)	82- (1)	-	Severe	Slight	Slight	Slight	Slight	Pines
3	St. Lucie sand	B1	60- (2)	35- (1)	-	60*- -	-	Severe	Severe	Moderate	Slight	Slight	Pines
4	Caroline clay loam Caroline fine sandy loam Caroline fine sandy loam, thick surface Kalmia sandy loam and fine sandy loam Marlboro fine sandy loam Norfolk sandy loam Norfolk loamy sand, thick surface	B3, C3 A1, B1 B1 A1 A1 A1, B1 A1, B1	77±4 (9)	70±3 (7)	70±7 (4)	77*- -	67- (1)	Moderate to Severe	Slight to Moderate	Slight to Moderate	Slight to Moderate	Slight to Moderate	Pines
5	Craven sandy loam and fine sandy loam Dunbar sandy loam and fine sandy loam Eulonia sandy loam and fine sandy loam Eulonia loamy fine sand, thick surface Fairhope fine sandy loam	A1, B1 A1 A1, B1 A1, B1 A1, B1, C1	84±3 (35)	73±8 (12)	73±8 (14)	84*- -	72- (1)	Severe	Slight to Moderate	Moderate	Slight to Moderate	Slight	Pines
6	Charleston fine sandy loam Goldsboro sandy loam and fine sandy loam Onslow sandy loam and fine sandy loam Seabrook loamy fine sand	A1 A1 A1 A1	88±5 (17)	71±5 (16)	85- (1)	90- (1)	73±5 (3)	Severe	Slight	Slight	Slight	Slight	Pines
7	Flint very fine sandy loam Wahee fine sandy loam and silt loam	A1 A1	91±3 (3)	70*-	70*-	91*- -	-	Slight or Severe	Slight to Severe	Moderate	Moderate	Slight	Pines and Lowland Hardwoods
8	Congaree silt loam	A1	114- (2)	-	-	114*- -	-	Slight or Severe	Slight	Moderate	Slight	Slight	Pines and Lowland Hardwoods
9	Edisto fine sandy loam and sandy loam Weston fine sandy loam and sandy loam	A1 A1	91±5 (34)	70±5 (9)	80*-	91*- -	72- (1)	Slight or Severe	Slight or Severe	Moderate to Severe	Slight	Slight	Pines and Lowland Hardwoods
10	Izagora sandy loam Lynchburg sandy loam and fine sandy loam	A1 A1	84±4 (8)	69±5 (20)	75*-	87- (1)	66±4 (4)	Severe	Slight	Moderate	Slight	Slight	Pines
11	Lenoir fine sandy loam	A1	87- (1)	65*-	77- (1)	87*-	-	Severe	Moderate	Moderate	Slight	Slight	Pines
12	Goldsboro loamy sand, sandy substratum Kiawah loamy fine sand Klej loamy sand and loamy fine sand Klej loamy sand, somewhat poorly drained Klej sand, shallow Ona loamy sand and sand	A1 A1 A1 A1 A1, B1 A1	74±8 (19)	66±4 (32)	65- (1)	74*- -	65±7 (10)	Moderate to Severe	Slight	Slight to Moderate	Slight	Slight	Pines and Lowland Hardwoods
13	Chewacla fine sandy loam and silt loam	A1	95±9 (3)	-	-	95*- -	-	Slight to Moderate or Severe	Slight to Severe	Severe	Slight	Slight	Lowland Hardwoods and Pines
14	Plummer sand and loamy fine sand Plummer sand, terrace	A1 A1	91±9 (4)	63±3 (3)	-	91*- -	78- (2)	Severe	Severe	Severe	Slight	Slight	Pines and Lowland Hardwoods
15	Coxville fine sandy loam, silt loam, loam, and clay loam Leaf very fine sandy loam and silt loam Rains sandy loam and fine sandy loam	A1 A1 A1	91±3 (28)	72±6 (11)	70- (1)	94±8 (4)	71±2 (3)	Moderate to Severe	Severe	Moderate to Severe	Slight	Slight	Pines and Lowland Hardwoods
16	Bladen fine sandy loam, loam, and silty clay loam	A1	93±5 (17)	-	85- (1)	93*- -	-	Slight or Severe	Moderate to Severe	Severe	Slight to Moderate	Slight	Pines and Lowland Hardwoods
17	Myatt sandy loam and fine sandy loam Portsmouth sandy loam, fine sandy loam, and loam Stono fine sandy loam	A1 A1 A1	100±8 (17)	71- (1)	-	91- (2)	74±9 (9)	Slight or Severe	Slight to Severe	Severe	Slight	Slight	Pines and Lowland Hardwoods
18	Rutlege loamy sand and loamy fine sand Rutlege loamy sand, poorly drained	A1 A1	90±6 (8)	71±6 (4)	-	86- (2)	69±4 (3)	Slight or Severe	Slight to Severe	Severe	Slight	Slight	Pines and Lowland Hardwoods
19	Bayboro loam Hyde loam	A1 A1	103±7 (4)	-	-	108- (1)	-	Slight or Severe	Slight to Severe	Severe	Slight	Slight	Pines and Lowland Hardwoods
20	Leon fine sand St. Johns sand and loamy fine sand	A1 A1	69- (2)	56±5 (8)	-	69*- -	60- (1)	Severe	Severe	Severe	Moderate	Slight	Pines
21	Wehadkee silt loam	A1	100*-	-	-	100*- -	-	Slight or Severe	Severe	Severe	Slight	Slight	Lowland Hardwoods and Pines

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TABLE 2 - WOODLAND SUITABILITY GROUPINGS OF SOILS WITH INTERPRETATIONS FOR MANAGEMENT AND TREATMENT - LOWER COASTAL PLAIN OF SOUTH CAROLINA (LAND RESOURCE AREA A2)

GROUP NO.	SOIL MAPPING UNIT		POTENTIAL SOIL PRODUCTIVITY - SITE INDEX AT 50 YEARS 2/					INTERPRETATIONS FOR WOODLAND CONSERVATION 3/					SUITABLE WOODCROPS
	SOIL SERIES, TYPE, AND PHASE	SLOPE AND EROSION CLASSES 1/	LOBLOLLY PINE	LONGLEAF PINE	SHORTLEAF PINE	SLASH PINE	POND PINE	PLANT COMPETITION	SEEDLING MORTALITY	EQUIPMENT LIMITATION	WINDTHROW HAZARD	EROSION HAZARD	
22	Bladen fine sandy loam, phosphatic	A1	106±2 (66)	77- (1)	95*- -	106*- -	-	Slight or Severe	Slight to Severe	Slight to Severe	Slight	Slight	Pines and Lowland Hardwoods
	Bladen silty clay loam, phosphatic	A1											
	Charleston fine sandy loam, phosphatic	A1											
	Edisto sandy loam, phosphatic	A1											
	Edisto fine sandy loam, phosphatic	A1											
	Eulonia fine sandy loam, phosphatic	A1											
	Hyde clay loam, phosphatic	A1											
	Meggett fine sandy loam and loam, phosphatic	A1											
	Meggett clay loam, phosphatic	A1											
	Stono fine sandy loam, phosphatic	A1											
	Stono fine sandy loam, thick surface, phosphatic	A1											
	Weston fine sandy loam, phosphatic	A1											
	Weston fine sandy loam, thick surface, phosphatic	A1											
23	Swamp	A1						Varied	Varied	Varied	Varied	Varied	Pines or Lowland Hardwoods
	Freshwater marsh	A1											
	Tidal marsh, firm acid clays	A1											
	Tidal marsh, soft acid clays	A1											
	Coastal beach sands	A1											

1/ Slope Classes: A = 0 to 2 percent, nearly level
B = 2 to 6 percent, gently sloping
C = 6 to 10 percent, sloping
D = 10 to 15 percent, strongly sloping
E = 15 to 25 percent, moderately steep
F = 25 percent and over, steep

Erosion Classes: 1 = none to slight (up to 25 percent of surface soil removed)
2 = moderate (25 to 75 percent of surface soil removed)
3 = severe (75 percent or more of surface soil and up to 25 percent of subsoil removed)

2/ Average site index calculated from measurements made on all mapping units included in each group. Standard deviations shown where three or more measurements were available. Numbers in parentheses indicate the number of measurements available. A dash in place of a site index value indicates that the species is generally not suited to the soils. Site index values marked by an asterisk (*) have been supplied based on experience, judgement, and other measurements.

3/ See text for a definition of these items.

Woodland Suitability Group No. 1 - Land Resource Area A2

These are deep, very friable to loose, excessively drained sands on the uplands of the Lower Coastal Plain. Infiltration and permeability are rapid and water-holding capacity is very low. These soils are low in organic matter content and natural fertility. Mapping units of the following soil types are in this group:

Blanton fine sand
Eustis fine sand
Lakeland sand
Wando sand
Wando fine sand

Slash and longleaf pines are preferred species but loblolly and shortleaf pines are also suited for both pulpwood and sawlog rotations. These soils are not suited to the production of poles and piling of long lengths but will produce medium length poles and piling with the preferred species being best for this purpose. Wind erosion is sometimes a problem on these soils and species for windbreak plantings include slash, loblolly, and longleaf pines, also red cedar, cherry laurel, Arizona cypress and ligustrums. Arizona cypress and red cedar are preferred species if Christmas trees are desired and for understory species in pine windbreaks. Important commercial hardwood species are not adapted to these soils. Oaks and hickories which occur naturally on these soils are primary wildlife food species.

Average site indexes are: loblolly pine 74 $\pm$ 4; longleaf pine 69 $\pm$ 4; shortleaf pine 64 $\pm$ 6; and slash pine 77. Approximate average annual growth per acre (board feet, Scribner) of well stocked unmanaged stands at 50 years of age is: loblolly pine 350; longleaf pine 215; shortleaf pine 270; slash pine 370.

Expected plant competition is severe. Blackjack oak, turkey oak, bluejack oak, sandhill post oak, sassafras, persimmon, sweetgum, and ground vegetation such as threeawns and bluestems, when present, compete very severely with preferred species for limited available moisture. Intensive treatments such as furrowing, disking, land clearing, brush cutting, undercutting root systems, prescribed burning, or application of herbicides, are frequently necessary to eliminate or control competing vegetation or to prepare sites prior to establishing seedlings.

Seedling mortality is expected to be moderate. Restocking of abandoned fields, open areas or regeneration openings, where plant competition is controlled or eliminated, is satisfactory, assuming seed sources are adequate for natural regeneration or that proper techniques are used when planting seeds or seedlings. Light seedbed preparation may be beneficial for such seeding or planting but is not considered essential. A survival of 50 to 75 percent may be expected of planted seedlings. Some replanting may be needed to fill in large openings, especially during seasons of below-normal precipitation during the growing season.

Equipment limitations are slight. These soils have loose sandy surfaces and light, rubber-tired vehicles have poor traction during periods of drought. Heavier equipment is not well supported and requires extra power to operate. However these soils do not restrict the operation of most equipment. These sands are more abrasive than soils having finer textures and cause more wear on equipment during normal operations.

Trees are not normally subject to windthrow on these soils.

Erosion hazards are considered slight although soil blowing may be a very severe local problem during spring months on open areas where pine seedlings are being established. Protection by windstrips may be necessary to establish seedlings in such a case.

Nantucket pine tip moth *(Rhyacionia frustrana,* Comst.*)*, attacks loblolly pine and shortleaf pine severely on these soils, Wakeley (1935) (55). The hazard of brown-spot needle blight [*Scirrhia acicola* (Dearn.) Siggers] on longleaf pine planted on cleared sites is much greater than on less open areas, as seedlings are fully exposed to spores carried by wind or rain splash, Scheer (1959) (59) and lack of fuel makes prescribed burning as a control measure impracticable. A root rot fungus *(Fomes annosus)* that attacks many conifers, appears to affect pines significantly on these soils. Nematodes, known to be favored by sandy soils such as these, Wakeley (1935) (53) severely affect seedlings of susceptible species. Soil areas formerly used as cropland may be severely infested by these

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pests. Soil fumigation, Hansbrough and Hollis (1959) (92) or other treatments may be necessary to control parasitic nematodes, in nurseries on these soils. Trees on these soils are only moderately vigorous and evidence of insect and disease damage on them is common.

Woodland Suitability Group No. 2 - Land Resource Area A2

These are moderately deep to deep, friable, excessively drained sands of the lower Coastal Plain. Infiltration and permeability are rapid and water-holding capacity is low. Organic matter content and natural fertility are low. Mapping units of the following soils are included:

Lakeland sand, terrace
Lakeland loamy sand, shallow, terrace
Lakeland sand, shallow
Wando sand, shallow

Longleaf and slash pines are preferred species but loblolly and shortleaf pines are also suited for both pulpwood and sawlog rotations. These soils are suited to the production of poles and piling of medium lengths. Arizona cypress and red cedar are suited to the production of Christmas trees and as understory species for windbreak plantings that are sometimes needed. Cherry laurel is also adapted for windbreak plantings. The important commercial hardwood species are not adapted to these soils. Oaks, hickories, persimmon and gums are primary wildlife food species.

Average site indexes for these soils are: loblolly pine 89 $\pm$ 3; longleaf pine 74 $\pm$ 7; shortleaf pine 79; and slash pine 82. Approximate average annual growth per acre (board feet, Scribner) of well stocked, unmanaged stands at 50 years of age is: loblolly pine 545; longleaf pine 275; shortleaf pine 485; slash pine 430. These soils are more productive than the soils in suitability group 1 because the coarse textured surfaces are less than 36 inches in thickness and moisture relations influenced by subsoils closer to the surfaces cause conditions to be more favorable to tree growth.

Severe plant competition may be expected. Blackjack oak, turkey oak, bluejack oak, post oak, water oak, live oak, red oak, hickory, persimmon, sweetgum, wiregrass, and other ground vegetation, if present, compete severely with the preferred species. On stream terraces, blackgum, water oak, and sassafras compete severely. Intensive treatments such as furrowing, disking, land clearing, brush cutting, undercutting root systems, prescribed burning, or application of herbicides, are frequently necessary to eliminate or control competing vegetation or to prepare sites prior to establishing seedlings.

Expected seedling mortality due to soil influences is considered slight. Restocking of abandoned fields, or open areas, or obtaining regeneration in reproduction openings, where plant competition is controlled or eliminated, is satisfactory, assuming seed sources are adequate for natural regeneration or that proper techniques are used when planting seed or trees. Light seedbed preparation may be beneficial but is not essential. Survival of 75 percent, or more, of planted seedlings can be expected and replanting to fill in large openings is not generally necessary.

Equipment limitations are slight. During drought periods, light vehicles with small rubber tires may have poor traction on these soils. Otherwise, these soils do not restrict the operation of commonly used equipment. These sands are more abrasive than soils with finer textures and equipment wear may be expected.

Trees are not normally subject to windthrow on these soils.

Erosion hazards are considered slight. Soil blowing may be a serious local problem in open areas during spring months. Protection by windstrips may be necessary to establish seedlings.

Nantucket pine tip moth (*Rhyacionia frustrana*, Comst.), attacks loblolly pine and shortleaf pine severely on these soils, Wakeley (1935) (55). The hazard of brown-spot needle blight [*Scirrhia acicola* (Dearn.) Siggers] on longleaf pine planted on cleared sites is much greater than on less open sites, as seedlings are fully exposed to spores carried by wind or rain splash, Scheer (1959) (59). Lack of fuel on cleared sites makes prescribed burning impracticable as a means of controlling this disease. A root rot fungus (*Fomes annosus*) that attacks many conifers, appears to affect pines significantly on these soils. Nematodes, known to be favored by sandy soils such as these, Wakeley (1935) (55) severely

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affect seedlings of susceptible species. Soil areas formerly used as cropland may be severely infested by these pests. Soil fumigation, Hansbrough and Hollis (1959) (92) or other treatment may be necessary to control parasitic nematodes, in nurseries on these soils. Trees on these soils are only moderately vigorous and evidence of insect and disease damage on them is common.

Woodland Suitability Group No. 3 - Land Resource Area A2

This is a deep, excessively drained sand with a weakly cemented acid organic hardpan. The surface soil is light gray and has a leached appearance. Infiltration and permeability are rapid. Water-holding capacity is low. Organic matter content and natural fertility are very low. Only one mapping unit of St. Lucie sand is included.

Slash, loblolly, and longleaf pines are preferred species on these soils. Sand pine is currently being tested in South Carolina but no definite results are available. Slash and loblolly pines on this soil will produce poles and piling of short length. Rotations which will produce pulpwood and small sawlog sizes are most economical. Longleaf pine is suited to pulpwood rotations only. Intensive management of this species may not be economical due to low potential production. Commercial hardwood species are not suited to these soils. Scrub oaks are primary wildlife food species suited to the sites but acorn production is limited by poor site.

Average site indexes are: loblolly pine 60; longleaf pine 35; and slash pine 60 (estimated). Approximate average annual growth per acre (board feet, Scribner) of well stocked, unmanaged stands at 50 years of age is: loblolly pine 170; slash pine 150. Longleaf pine is not generally suited to the commercial production of sawtimber.

Severe plant competition may be expected. Desert type vegetation such as turkey oak, bluejack oak, sandhills post oak, prickly pear, and saw palmetto compete severely with pine species for the limited moisture supplies. Intensive treatments such as furrowing, disking, land clearing, brush cutting, undercutting root systems, or application of herbicides, are frequently necessary to eliminate or control competing vegetation or to prepare sites prior to establishing seedlings.

A severe seedling mortality problem is recognized. Since these soils are inherently poor, they are used very little for agricultural purposes and there are few abandoned fields to be reforested. When such reforestation is needed, natural regeneration cannot be relied upon. Superior or "prescription" planting is necessary to secure desired stocking. Survival is often less than 50 percent of planted seedlings and replanting may be expected to fill in large openings.

Equipment limitations on this soil are considered moderate. The loose texture, hummocky topography, and hardpan layer of this soil result in moderate restrictions in the use of equipment, particularly during excessively wet or excessively dry periods.

There are no important windthrow or erosion hazards on this soil in woodland uses.

Woodland Suitability Group No. 4 - Land Resource Area A2

These are deep, well-drained soils with sandy loam surfaces and friable, moderately fine textured subsoils. An exception, Caroline clay loam, on 2 to 10 percent slopes, is severely eroded. Infiltration, permeability, and water-holding capacity are moderate. Organic matter content and natural fertility are moderate. Mapping units of the following are included:

Caroline clay loam
Caroline fine sandy loam
Caroline fine sandy loam, thick surface
Kalmia sandy loam
Kalmia fine sandy loam
Marlboro fine sandy loam
Norfolk sandy loam
Norfolk loamy sand, thick surface

Loblolly and slash pines are preferred species but longleaf and shortleaf pines are also suited to sawtimber and pulpwood rotations. These soils are suited to the production of poles and piling of short and medium lengths. Red cedar, cherry laurel, and Arizona

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cypress are adapted as understory for windbreak plantings where they are needed. The important commercial hardwoods are not generally suited to these soils. Oaks, hickories, persimmon, black cherry, mulberry, dogwood, redgum, and pecan are wildlife food species suited to these soils.

Average site indexes are: loblolly pine 77 ± 4; longleaf pine 70 ± 3; shortleaf pine 70 ± 7; slash pine 77 (estimated); and pond pine 67. Approximate average annual growth per acre (board feet, Scribner) of well stocked unmanaged stands at 50 years of age is: loblolly pine 390; longleaf pine 230; shortleaf pine 360; slash pine 375; pond pine 100.

Plant competition is rated moderate to severe. Red oak, white oak, live oak, water oak, sassafras, sweet gum, dogwood, persimmon, scrub oaks, hickory and other vegetation restrict the growth and development of preferred pine species. On the thick surface phases competition is severe. Intensive treatments such as furrowing, disking, land clearing, brush cutting, undercutting root systems, prescribed burning, or application of herbicides is frequently necessary to control or eliminate competing vegetation or to prepare sites prior to establishing seedlings. On the other soils in this group, plant competition is moderate and regeneration of desired species may be delayed due to plant competition. On them, intensive treatments to control competition are not considered essential but some treatments may be used effectively if desired.

Seedling mortality due to soil influences is regarded slight to moderate. On all but Caroline clay loam satisfactory restocking generally is obtained from a first planting. If adequate sources of seed are available, and other silvicultural requirements exist, a satisfactory stand of trees is generally obtained through natural regeneration. On Caroline clay loam, where seedling mortality is more serious, site preparation, superior planting techniques, and replanting may be required for adequate stocking. Natural regeneration may not be satisfactory on this soil.

Equipment limitations are slight on soils in this group except on Caroline clay loam, where the hazard is moderate due to slope, erosion, and plasticity of the subsoil close to the surface.

The hazard of windthrow is slight except on Caroline clay loam where it is moderate and windfall is expected during highest normal wind velocities and where trees are exposed.

Erosion is a moderate hazard on Caroline clay loam, but unimportant on the other soils in this group.

Woodland Suitability Group No. 5 - Land Resource Area A2

These are moderately deep to deep soils with sandy loam and fine sandy loam surface soils and heavy sandy clay loam subsoils. They are moderately well to somewhat poorly drained. Infiltration is moderate and permeability is slow. Water-holding capacity is moderate. Organic matter content and natural fertility are medium. On Craven soils the water-holding capacity is high. However, the shallow solum and slow permeability restricts the availability of moisture. Mapping units of the following soils are in this group:

Craven sandy loam
Craven fine sandy loam
Dunbar sandy loam
Dunbar fine sandy loam
Eulonia sandy loam
Eulonia fine sandy loam
Eulonia loamy fine sand, thick surface
Fairhope fine sandy loam

Loblolly and slash pines are preferred species, but longleaf and shortleaf pines are also acceptable. These soils are suited to sawtimber and pulpwood rotations and are capable of producing medium length poles and piling. The commercially important hardwood species are not generally suited to these soils. Beech, black cherry, dogwood, mulberry, oaks, hickory, and pecan are wildlife food species suited to these soils.

Average site indexes at 50 years are: loblolly pine 84 ± 3; longleaf pine 73 ± 8; shortleaf pine 73 ± 8; slash pine 84 (estimated) and pond pine 72. Approximate average annual growth per acre (board feet, Scribner) of well stocked unmanaged stands at 50 years of age is: loblolly pine 480; longleaf pine 265; shortleaf pine 400; slash pine 455; pond

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pine 125.

Plant competition may be expected to be severe on these soils. Post oak, red oak, water oak, willow oak, hickory, sweetgum, holly, and other vegetation, when present, compete severely with pine species. Intensive treatments such as furrowing, disking, land clearing, brush cutting, undercutting root systems, prescribed burning, or application of herbicides, are usually necessary to eliminate or control competing vegetation or to prepare sites prior to establishing seedlings.

Seedling mortality varies from slight to moderate. Restocking of abandoned fields, open areas, or regeneration openings, where plant competition is controlled or eliminated is satisfactory, assuming seed sources are adequate for natural regeneration or that proper techniques are used when planting seed or seedlings. Light seedbed preparation may be beneficial but is generally not regarded as essential. A survival of more than 75 percent of planted seedlings can be expected normally. Mortality of seedlings during drought is generally more severe on Eulonia loamy fine sand, thick surface, and on local soil areas with thin sola.

Equipment use and operation is moderately restricted because of the impervious, fine textured subsoils, especially where surface layers are shallow. Drainage is required to maintain roads for logging or access. Concentration of cattle and operation of equipment on these soils, when wet, compacts them and severely damages tree roots.

Windthrow hazard is slight, except on local areas of Craven soils, where it is moderate. Craven soils have areas where the profile is subnormal in thickness. Here, root development is restricted and trees are not stable during high winds when the soil is wet. When trees are released on all sides during cutting operations, considerable losses may result on the Craven soils.

There is no special erosion hazard except on the sloping phase of the Fairhope soils. Here, slopes are short but require some consideration in location of roads and firebreaks, and use of discretion in tillage or other operations that normally destroy protective ground cover or promote the concentration of water.

On Craven soils where the root zone is shallow, tree roots are more susceptible to damage by fire. Disease and insect attacks are invited by root damage from fire, operation of equipment, or concentration of livestock.

Woodland Suitability Group No. 6 - Land Resource Area A2

These are moderately well drained soils with sandy loam and loamy sand surface soils and subsoils. In places the light sandy clay subsoils frequently become coarser textured at 36 inches. Infiltration, permeability, and water-holding capacity, are moderate. Organic matter content and natural fertility are moderate. The Seabrook loamy sand is an exception, with rapid infiltration and permeability. Iron and manganese concretions occur in the Charleston fine sandy loam and Seabrook loamy fine sand. Mapping units of the following soils are included in this group:

Charleston fine sandy loam
Goldsboro sandy loam
Goldsboro fine sandy loam
Onslow sandy loam
Onslow fine sandy loam
Seabrook loamy fine sand

Loblolly, slash, and shortleaf pines are preferred species. Longleaf is also suitable. These sites are adapted to sawtimber and pulpwood rotations and will produce medium length poles and piling. Oaks and hickories are the primary wildlife food species suited to these soils.

Average site indexes at 50 years are: loblolly pine 88 $\pm$ 5; longleaf pine 71 $\pm$ 5; shortleaf pine 85; slash pine 90 (estimated); pond pine 73 $\pm$ 5. Approximate average annual growth per acre (board feet, Scribner) of well stocked, unmanaged stands at 50 years of age is: loblolly pine 530; longleaf pine 240; shortleaf pine 575; slash pine 520; pond pine 130.

Plant competition is regarded as severe on these soils. Sweetgum, hickory, maple, dogwood,

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holly, various oaks including red oaks, white oaks, post oaks, and live oaks, and other vegetation such as myrtle, bay, and gallberry, if present, compete severely with preferred species. Intensive treatments such as prescribed burning, furrowing, disking, land clearing, brush cutting, undercutting root systems, or application of herbicides, are frequently necessary to eliminate or control competing vegetation or, to prepare sites prior to establishing seedlings.

Mortality of seedlings, due to soil influences, is generally less than 25 percent. Restocking of abandoned fields or open areas where plant competition is controlled or eliminated is satisfactory, assuming seed sources are adequate for natural regeneration or that proper techniques are used when planting seed or seedlings.

There are no special equipment limitations or hazards of windthrow or erosion on these soils.

Woodland Suitability Group No. 7 - Land Resource Area A2

These soils occur on stream terraces and are moderately well to somewhat poorly drained sandy loams and silt loams with fine-textured subsoils. The surface soil is thin and since the subsoil is fine textured infiltration and permeability are slow and water-holding capacity is moderate. Mapping units of the following soils are included.

Flint very fine sandy loam
Wahee fine sandy loam
Wahee silt loam

Loblolly pine, slash pine, and commercially valuable hardwoods including ash, sweetgum, blackgum, white oak, cherrybark oak, Shumard oak, and red maple are preferred species. Longleaf and shortleaf pine are also suitable for growth on these soils.

These soils are suited to sawtimber and pulpwood rotations and to the production of poles and piling of long lengths. The preferred species are important wildlife food species.

Average site indexes are: loblolly pine 91 $\pm$ 3; longleaf pine 70 (estimated); shortleaf pine 70 (estimated); and slash pine 91 (estimated). Approximate average annual growth per acre (board feet, Scribner) of well-stocked unmanaged stands at 50 years of age is: loblolly pine 570; longleaf pine 230; shortleaf pine 360; and slash pine 530.

Plant competition is severe for pines and the intolerant hardwoods which are preferred species. Intensive treatments such as land clearing, disking, brush cutting, prescribed burning, or applying herbicides, frequently are necessary to eliminate or control competing vegetation and to prepare sites prior to establishing regeneration. Where there is no species preference, the hazard may be considered slight, and usually a well-stocked stand of mixed species will develop.

Seedling mortality may be slight to severe. A survival of 75 percent or more of planted seedlings is expected normally but 25 to 50 percent loss may occur during periods of abnormal drought. This is due to shallow surface soil and limited moisture. Where plant competition is controlled and seed sources are adequate, well-stocked stands of natural regeneration are expected. These soils are subject to overflow and when prolonged inundations occur during seed germination or during the growing season, mortality is severe even for water-tolerant species.

Equipment limitations are regarded as moderate. These soils puddle and pack easily and concentration of livestock or operation of equipment during wet periods should be avoided. Overflow interferes with the use and management of these soils. Some types of equipment and tools are difficult to use during drought. Water management is needed to facilitate operations and maintain roads.

Tree root-growth is impeded due to the shallow surface soil and fine-textured, moderately permeable subsoil. Trees are not completely stable and windthrow is expected during excessively wet seasons or during high winds.

Erosion is no special hazard on this group of soils.

Dieback of hardwoods may occur during drought on these soils. Root rot *(Fomes annosus)* and insect attacks are invited when roots are damaged by fire (particularly during summer),

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wind, operation of equipment, or concentration of livestock.

Woodland Suitability Group No. 8 - Land Resource Area A2

This is a deep, nearly level, moderately well to well drained, alluvial soil of the flood plain along streams. It occurs on river fronts and on higher elevations of alluvial flood plains and is subject to occasional overflow. Infiltration is slow, permeability is moderate and water-holding capacity is moderate. Moisture supply is favorable for tree growth. Organic matter content and natural fertility are moderate. One mapping unit, Congaree silt loam, is included.

Sweetgum, yellow poplar, blackgum, ash, sycamore, cottonwood, black walnut, red maple, cherrybark oak, Shumard oak, white oak, cow oak, loblolly pine and slash pine are preferred species. Other suitable species include hackberry, beech, birch, American elm, winged elm, hickory, magnolia, post oak, water oak, willow oak, persimmon, mulberry, dogwood, red cedar, and honey locust.

This soil is suited to sawtimber and pulpwood rotations and to the production of high quality veneer and long poles and piling. Most of the species mentioned above are important wildlife food producers.

Average site indexes at 50 years of age are: loblolly pine 114; slash pine 114 (estimated). Approximate average annual growth per acre (board feet, Scribner) of well-stocked unmanaged stands at 50 years of age is: loblolly pine 910; slash pine 750.

Competition between species and by undergrowth vegetation of grasses, vines, and reeds, is severe, particularly with intolerant species. Intensive treatments such as land clearing, disking, furrowing, brush cutting, prescribed burning, or application of herbicides, are necessary to eliminate or control competing vegetation or to prepare sites for establishing seedlings. Where species preference is not important, and intensive site treatments or vegetation controls are not applied, the hazard of competition exists, but becomes insignificant. The composition of forest stands develops toward the more tolerant species.

Restocking of fields or areas where competing vegetation is controlled, is generally satisfactory, assuming seed sources are adequate or that proper techniques are used when planting seed or seedlings. Mortality of planted seedlings is usually less than 25 percent. Periods of overflow are generally short in duration but regeneration of some species will be adversely affected by prolonged inundation and silting.

When wet, these fine textured soils will puddle and pack. Concentration of cattle, tillage, or use of equipment, should be avoided during wet periods to prevent damage to the soil structure and tree roots. Occasional overflows restrict access and use. Usually the season of restriction is less than three months during the year.

Erosion and windthrow are not special hazards on these soils.

During prolonged drought sweetgum or other species may suffer "dieback".

Woodland Suitability Group No. 9 - Land Resource Area A2

These are somewhat poorly drained sandy loams with sandy loam to sandy clay loam subsoils occurring on low marine terraces. They are level to nearly level and in some instances are slightly depressed, so that water stands on the surface at times. Infiltration and permeability are moderate and water-holding capacity is moderate to high. Organic matter content is low to moderate and natural fertility is moderate. These soils normally have moisture supplies favorable to tree growth throughout the year.

Mapping units of the following soils are included in this group:

Edisto fine sandy loam
Edisto sandy loam
Weston fine sandy loam

Commercially valuable bottomland hardwoods including sweetgum, blackgum, ash, yellow poplar, red maple, cherrybark oak, cow oak, Shumard oak, and white oak are preferred species. Where drainage is sufficient loblolly, slash, and shortleaf pines also are preferred species.

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These soils are suited to sawtimber and pulpwood rotations and to the production of high quality veneer and poles and piling of medium to long lengths. The preferred species are generally important wildlife food producers.

Average site indexes have not been fully determined for commercial hardwood species. Site indexes at 50 years for pine species are: loblolly pine 91 ± 5; longleaf pine 70 ± 5; shortleaf pine 80 (estimated); slash pine 91 (estimated); pond pine 72. Approximate average annual growth per acre (board feet, Scribner) of well stocked, unmanaged stands at 50 years of age is: loblolly pine 570; longleaf pine 230; shortleaf pine 500; slash pine 530; pond pine 125.

Competition between species and by undergrowth vegetation of grasses, vines, and reeds is severe, particularly with intolerant species. Intensive treatments such as land clearing, disking, furrowing, brush cutting, prescribed burning, or application of herbicides are necessary to eliminate or control competing vegetation or to prepare sites to establish seedlings. Where species preference is not important and when intensive site treatments or vegetation controls are not applied, the hazard of competition exists but becomes insignificant. The composition of forest stands develops toward the more tolerant species. In depressions where water stands, competition will be limited to species tolerant of excess moisture.

Water management, control of competing vegetation, and superior management techniques are necessary to regenerate selected species (Plate 8). Otherwise, mortality of seedlings of the desired species may be severe and attempts to establish them will be impractical. If no choice of species exists, usually an acceptable stand of hardwoods will develop from sprouts or seedlings. Conversion of mixed hardwood stands to selected hardwood or pine species requires intensive and expensive treatments.

In depressions where water stands, grazing and the use of equipment are severely limited. Water management including drainage and installation of water control structures is necessary to maintain access roads and to utilize the sites most efficiently. Where water does not stand the restriction is moderate and of less than three months' duration during the year.

Erosion and windthrow are not special hazards on these soils.

In depressions where root zone is restricted by excess water, roots are severely damaged by fire, particularly during summer, when these sites are dry enough to burn. Disease and insect attacks are invited by such damage.

Woodland Suitability Group No. 10 - Land Resource Area A2

These are somewhat poorly drained soils with deep, dark gray sandy loam surface soils underlain by mottled sandy loam or sandy clay loam subsoils. They occur on stream terraces or on flat uplands. Infiltration, permeability, and water-holding capacity are moderate. Organic matter content and natural fertility are moderate. Mapping units of the following soils are included in this group:

Izagora sandy loam
Lynchburg fine sandy loam
Lynchburg sandy loam

Loblolly and slash pines are preferred species. Longleaf and shortleaf pines, also, are suitable. These soils are suited to sawtimber and pulpwood rotations and to the production of medium length poles and piling. Oaks, sweetgum, and maple are primary wildlife food species.

Average site indexes are: loblolly pine 84 ± 4; longleaf pine 69 ± 5; shortleaf pine 75 (estimated); slash pine 87; pond pine 66 ± 4. Approximate average annual growth per acre (board feet, Scribner) of well stocked, unmanaged stands at 50 years of age is: loblolly pine 480; longleaf pine 220; shortleaf pine 430; slash pine 490; pond pine 95.

Sweetgum, oaks, gallberry, wiregrass, and other vegetation compete severely with preferred species. Intensive treatment such as water management, prescribed burning, land clearing, disking, brush cutting, or application of herbicides, is frequently necessary to eliminate or control competing vegetation or to prepare sites prior to establishing seedlings.

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Plate 8 - Water level under control as part of water management of woodlands.

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Mortality of seedlings is influenced by moisture stresses in these soils but it is considered slight. Large flat areas have limited moisture supply during dry weather and become very wet when rainfall is plentiful. Survival of seedlings normally is expected to exceed 75 percent. Growth and development of seedlings planted in furrows may be retarded by water standing in the furrows. When seed supply and moisture conditions are favorable natural regeneration in open areas is expected to be adequate. Water management favors regeneration on these soils.

Equipment limitations are moderate. The somewhat poor natural drainage restricts grazing, access, and use of equipment. Usually the season of restriction is less than three months during the year. Water management and adequate drainage of roads is required to utilize fully these sites or to prevent damage to tree roots by livestock or equipment.

Windthrow and erosion hazards are slight on these soils.

Woodland Suitability Group No. 11 - Land Resource Area A2

This is a deep, nearly level to gently sloping, somewhat poorly drained, fine sandy loam with fine-textured, slowly permeable subsoils. Infiltration is slow and water-holding capacity is high. Organic matter content and natural fertility are low. One mapping unit, Lenoir fine sandy loam, is included.

Loblolly and slash pines are preferred species but shortleaf pine is also suitable. This soil is suited to sawtimber and pulpwood rotations and to the production of medium length poles and piling. Oaks and hickory are primary wildlife food species.

Average site indexes are: loblolly pine 87; longleaf pine 65 (estimated); shortleaf pine 77; slash pine 87 (estimated). Approximate average annual growth per acre (board feet, Scribner) of well stocked unmanaged stands at 50 years of age is: loblolly pine 520; longleaf pine 170; shortleaf pine 460; slash pine 490.

Sweetgum, oaks, hickory, holly, gallberry, wax myrtle, and low-growing shrubs and vegetation compete severely with preferred species. Intensive treatments such as prescribed burning, water management, land clearing, disking, brush cutting, and application of herbicides, are frequently necessary to eliminate or control competing vegetation or to prepare sites prior to establishing seedlings.

Mortality of seedlings, considered moderate, normally is expected to range from 25 to 50 percent of planted stock. Replanting is necessary to fill in large openings that are expected. Water management to remove excess surface water during germination of seeds or when planting seedlings is needed to establish new stands during wet seasons. Growth and development of seedlings may be restricted by excess water.

Normally there is a moderate restriction in grazing, access, or use of equipment. During wet years the restriction is more severe and of more than 3 months in duration. Water management is required to utilize fully the site and to prevent damage to tree roots by livestock trampling or equipment use.

Windthrow and erosion are not serious hazards on this soil.

Woodland Suitability Group No. 12 - Land Resource Area A2

These are deep, friable, somewhat poorly drained sands and loamy sands on level to nearly level areas or in slight depressions. Ona sand and loamy sand have a weakly developed organic pan. Infiltration and permeability are rapid for this group of soils and water-holding capacity is low. Organic matter content and natural fertility are low. Mapping units of the following soils are included in this group:

Goldsboro loamy sand, sandy substratum
Kiawah loamy fine sand
Klej loamy sand
Klej loamy sand, somewhat poorly drained
Klej loamy fine sand
Klej sand, shallow
Ona loamy sand
Ona sand

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Loblolly and slash pines are preferred species but shortleaf, longleaf, and pond pine are also suitable for growth on these soils.

These soils are suited to sawtimber and pulpwood rotations and to the production of short to medium length poles and piling. Oaks, hickory, maple, sweetgum, and blackgum are primary wildlife species.

Average site indexes are: loblolly pine 74 ± 8; longleaf pine 66 ± 4; shortleaf pine 65; slash pine 74 (estimated); pond pine 65 ± 7. Approximate average annual growth per acre (board feet, Scribner) of well stocked, unmanaged stands at 50 years of age is: loblolly pine 350; longleaf pine 180; shortleaf pine 285; slash pine 335; pond pine 90.

Competition from oaks, sweetgum, blackgum, maple, hickory, holly, gallberry and other vegetation, including wiregrass, is moderate to severe. Prescribed burning, disking, furrowing, undercutting root systems, brush cutting, or applying herbicides, are frequently necessary to eliminate or control competing vegetation.

Seedling mortality is no special problem in open areas where plant competition is controlled or negligible and seed sources are adequate. Survival of 75 percent or more of planted seedlings is expected and replanting is not generally necessary.

There is a moderate restriction in the use of equipment in depressions, on shallow phases and where organic hardpan occurs. This moderate restriction is due to somewhat poor drainage, but usually is of less than three months' duration during the year.

Windthrow and erosion are not special hazards on these soils.

Woodland Suitability Group No. 13 - Land Resource Area A2

These are moderately deep, friable, somewhat poorly drained, fine sandy loam and silt loam soils, with friable, moderately permeable subsoil. They occur on stream bottoms of the lower Coastal Plain. Infiltration and water-holding capacity are moderate. Organic matter content and natural fertility are moderate.

Mapping units of the following soils are included:

Chewacla fine sandy loam
Chewacla silt loam

Sweetgum, blackgum, cherrybark oak, cow oak, Shumard oak, white oak, ash, loblolly pine, cypress, and red maple are preferred species. The following species are of intermediate priority: willow oak, water oak, post oak, hackberry, American elm, winged elm, hickory, American beech, persimmon, and mulberry. Weed species include box elder, blue beech, hophornbeam, hawthorne, and live oak.

This soil is suited to sawtimber and pulpwood rotations, to the production of high quality veneer, and to medium and long length poles and piling. Most of the above species are primary wilflife food species.

Average site indexes are loblolly pine 95 ± 9; slash pine 95 (estimated). Site indexes for commercial hardwood species have not been fully determined. Approximate average annual growth per acre (board feet, Scribner) of well stocked, unmanaged stands at 50 years of age is: loblolly pine 630; slash pine 570.

The natural vegetation, composed primarily of hardwoods and ground cover, competes severely with pine species. Prescribed burning, applying herbicides, land clearing, disking, or other intensive treatment is necessary to control or eradicate competing vegetation and to prepare seedbeds for restocking to pine species. For the regeneration of specific hardwoods, the competition hazard may be severe, and intensive treatment may be needed. If no particular species is preferred, the hazard is slight to moderate. A mixed stand of hardwoods can be regenerated, but this may be delayed and growth may be retarded by competition.

Seedling mortality due to soil influence is classed as slight to severe and varies by individual tree species. Overflow is hazardous to germination of seed and growth of seedlings of conifers and hardwoods. Prolonged inundation and silting during early spring is particularly detrimental to recently germinated seedlings. Water management

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improves site quality and reduces mortality but frequently is not feasible.

The use of equipment is restricted by overflow and somewhat poor drainage. Adequate drainage is needed for roads. The use of equipment and grazing should be avoided when these soils are wet to avoid compaction and damage to tree roots. Water management facilitates access and woodland operations but overflow and debris interfere with drainage and the efficient operation of water control structures.

Windthrow and erosion are not special hazards on this soil. Dieback of hardwoods may be expected during drought.

A wide variety of species is suited to this soil. The production potential is excellent and justifies intensive treatment that includes the selection of species and improvement of sites. To attain the potential production indicated, it is necessary to recognize the specific requirements of this soil and plan for specific treatment needed for each species. Putnam, Furnival, and McKnight (1960) (21) list approximately 70 important commercial species of the Southern bottomlands and describe important characteristics and site requirements for them.

Woodland Suitability Group No. 14 - Land Resource Area A2

These are deep, friable, poorly drained soils, with sand or loamy sand texture to a depth of 36 inches or greater. Infiltration and permeability rates are rapid, and water-holding capacity is low. Organic matter content and natural fertility are low. Mapping units of the following soils are included in this group:

Plummer sand
Plummer loamy fine sand
Plummer sand, terrace

Loblolly and slash pine are preferred species where drainage is adequate; otherwise, pond pine, pond cypress, and blackgum are suited to these soils.

These soils are favorable for sawtimber and pulpwood rotations and will produce medium to long poles and piling when drained. Production potentials are severely restricted by inadequate drainage. Without drainage poor quality water-tolerant species predominate and are difficult to manage economically on these soils. Maple, gums, and cypress are primary wildlife food species.

Average site indexes are: loblolly pine 91 $\pm$ 9; longleaf pine 63 $\pm$ 3; slash pine 91 (estimated); pond pine 78. Approximate average annual growth per acre (board feet, Scribner) of well-stocked, unmanaged stands at 50 years of age is: loblolly pine 570; longleaf pine 150; slash pine 530; pond pine 155.

Gallberry, myrtle, shrubs, vines, and briars compete severely with preferred species. Water-tolerant grasses, sedges, and other plants are common. Intensive treatment such as brush cutting, disking, land clearing, furrowing, prescribed burning, or application of herbicides, is frequently necessary to eliminate or control competing vegetation or to prepare sites prior to establishing seedlings.

Mortality of seedlings of preferred species is severe due to excess water but where drainage is adequate, seedling mortality is slight. On the wet areas where only a few trees of water-tolerant species are present, water management is necessary to establish well-stocked stands. In some areas, adequate outlets for drainage are not readily available.

Poor drainage restricts severely the use of equipment. Water management is necessary to maintain access roads and to manage stands effectively.

There are no special hazards of windthrow or erosion.

Damage to roots by fire (particularly during droughty summers) is severe on these soils and encourages insect and disease attacks.

Woodland Suitability Group No. 15 - Land Resource Area A2

These are poorly drained soils with tough subsoil through which water moves slowly. Infiltration and permeability are slow and water-holding capacity is moderate. Organic-

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matter content and natural fertility are moderate. These soils occupy nearly level or depressional areas. Mapping units of the following soils are included in this group:

Coxville fine sandy loam
Coxville silt loam
Coxville loam
Coxville clay loam
Leaf very fine sandy loam
Leaf silt loam
Rains sandy loam
Rains fine sandy loam

When drainage is adequate, loblolly and slash pine are preferred species. Longleaf and pond pine are present where fire occurred frequently. In depressions, cypress and tupelo gum are common species. Some areas, where water stands for long periods, are treeless, except around the edges of depressions.

These soils are suited to sawtimber and pulpwood rotations and will produce medium to long length poles and piling. Gums, maple, sweetbay, and cypress are primary wildlife food species.

Average site indexes are: loblolly pine 91 $\pm$ 3; longleaf pine 72 $\pm$ 6; shortleaf pine 70; slash pine 94 $\pm$ 8; pond pine 71 $\pm$ 2. Approximate average annual growth per acre (board feet, Scribner) of well-stocked unmanaged stands at 50 years of age is: loblolly pine 570; longleaf pine 250; shortleaf pine 360; slash pine 560; pond pine 120.

Sweetgum, maple, holly, elm, ironwood, gallberry, myrtle, shrubs, and vines compete severely with pine species. Intensive treatments, such as prescribed burning, disking, land clearing, brush cutting, and applying herbicides, is necessary to eliminate or control competing vegetation prior to planting seed or seedlings. In depressions where drainage is inadequate for preferred pine species, cypress and hardwoods are preferred and the hazard of competition is moderate. Establishment or growth of seedlings or sprouts may be delayed and some site preparation or selective control measures will be beneficial.

Mortality of pine seedlings is severe in depressions due to excess water. Inundation during growing season causes mortality of pine seedlings, and is detrimental to seedlings of water-tolerant species.

In depressions and where surface soil is of fine texture, water management is required to permit access and to maintain roads. Concentration of livestock and operation of equipment during wet periods should be avoided to prevent compaction and damage to tree roots. On sites with better drainage slow surface runoff and poor internal drainage moderately restrict the use of equipment. Generally, the restriction is of less than three months' duration during the year.

There are no special hazards of windthrow or erosion on these soils.

Where root zones are restricted by excess water in depressions, damage to tree roots by fire is severe, particularly during summer. Damage to roots invites insect and disease attacks.

Woodland Suitability Group No. 16 - Land Resource Area A2

These are deep, poorly drained soils with firm, slightly plastic subsoil. Infiltration and permeability are slow and water-holding capacity is moderate. Organic matter content and natural fertility are moderate.

Mapping units of the following soils are included.

Bladen fine sandy loam
Bladen loam
Bladen silty clay loam

Loblolly and slash pine are preferred species, but shortleaf and longleaf pine are suited to a lesser degree. Sweetgum, oaks, hickory, and ash are also suited to these soils.

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These soils are suited to sawtimber and pulpwood rotations and will produce poles and piling of medium to long lengths (Plate 9). Ash, beech, elm, gums, maple, hickory, and oaks are primary wildlife food species.

Average site indexes are: loblolly pine 93 ± 5; shortleaf pine 85; slash pine 93 (estimated). Approximate average annual growth per acre (board feet, Scribner) of well-stocked unmanaged stands at 50 years of age is: loblolly pine 600; shortleaf pine 575; slash pine 550.

Sweetgum, oaks, hickory, myrtle, bay, and other vegetation compete severely with preferred pine species or with hardwoods selected for management. Intensive treatments such as prescribed burning, applying herbicides, land clearing, disking, and brush cutting are frequently necessary to eliminate or control competing vegetation or to prepare sites prior to establishing seedlings. Where there is no special preference of species the hazard is considered slight and generally a well-stocked stand of mixed species can be attained easily.

Mortality of seedlings of preferred species due to soil influences is severe where the surface soil is thin or surface water is excessive. Poor drainage and fine texture of surface soil contribute to seedling mortality. The hazard is moderate on the sandy loam soil where moisture is more favorable to the establishment of seedlings. Survival of 50 to 75 percent of planted seedlings is expected. Some replanting is necessary to fill in large openings. Water management is required to utilize fully these sites for pines.

Excessive moisture supply, poor drainage, and fine surface texture, severely restrict the use of equipment. Water management is necessary to maintain access roads. When these soils are wet, operation of equipment and concentration of livestock should be avoided, to prevent compaction of soil and damage to tree roots.

There is a moderate hazard of windthrow where surface soil is shallow. Windfall can be expected from highest normal wind velocities where trees are exposed or stand densities reduced by management. Where surface soil is deep, windfall is no serious hazard.

There is no special hazard of erosion on these soils.

Damage to tree roots by fire, particularly during summer, is severe where surface soil is shallow. Disease and insect attacks are invited by such damage.

Woodland Suitability Group No. 17 - Land Resource Area A2

These are deep, very poorly drained soils with very dark gray or black surface soils and gray sandy loam to sandy clay loam subsoils. Infiltration, permeability, and water-holding capacity are moderate. The surface soil is high in organic matter content. Natural fertility is moderate. They occupy level to slight depressional areas. Mapping units of the following soils are included in this group:

Myatt sandy loam
Myatt fine sandy loam
Portsmouth sandy loam
Portsmouth fine sandy loam
Portsmouth loam
Stono fine sandy loam

These soils are adapted to sawtimber and pulpwood rotations. They will produce poles and piling of long lengths.

Loblolly and slash pine are preferred pines. Cypress, blackgum, tupelo gum, sweet gum, ash, red maple, pond pine, and water oak are also suitable species, and mostly are primary wildlife food species.

Average site indexes are loblolly pine 100 ± 8; longleaf pine 71; slash pine 91; and pond pine 74 ± 9. Average site indexes for other species have not been determined. Approximate average annual growth per acre (board feet, Scribner) of well-stocked unmanaged stands at 50 years of age is: loblolly pine 700; longleaf pine 240; slash pine 530; pond pine 135.

Other tree species and the undergrowth of briars, grass, vines, gallberry, and myrtle

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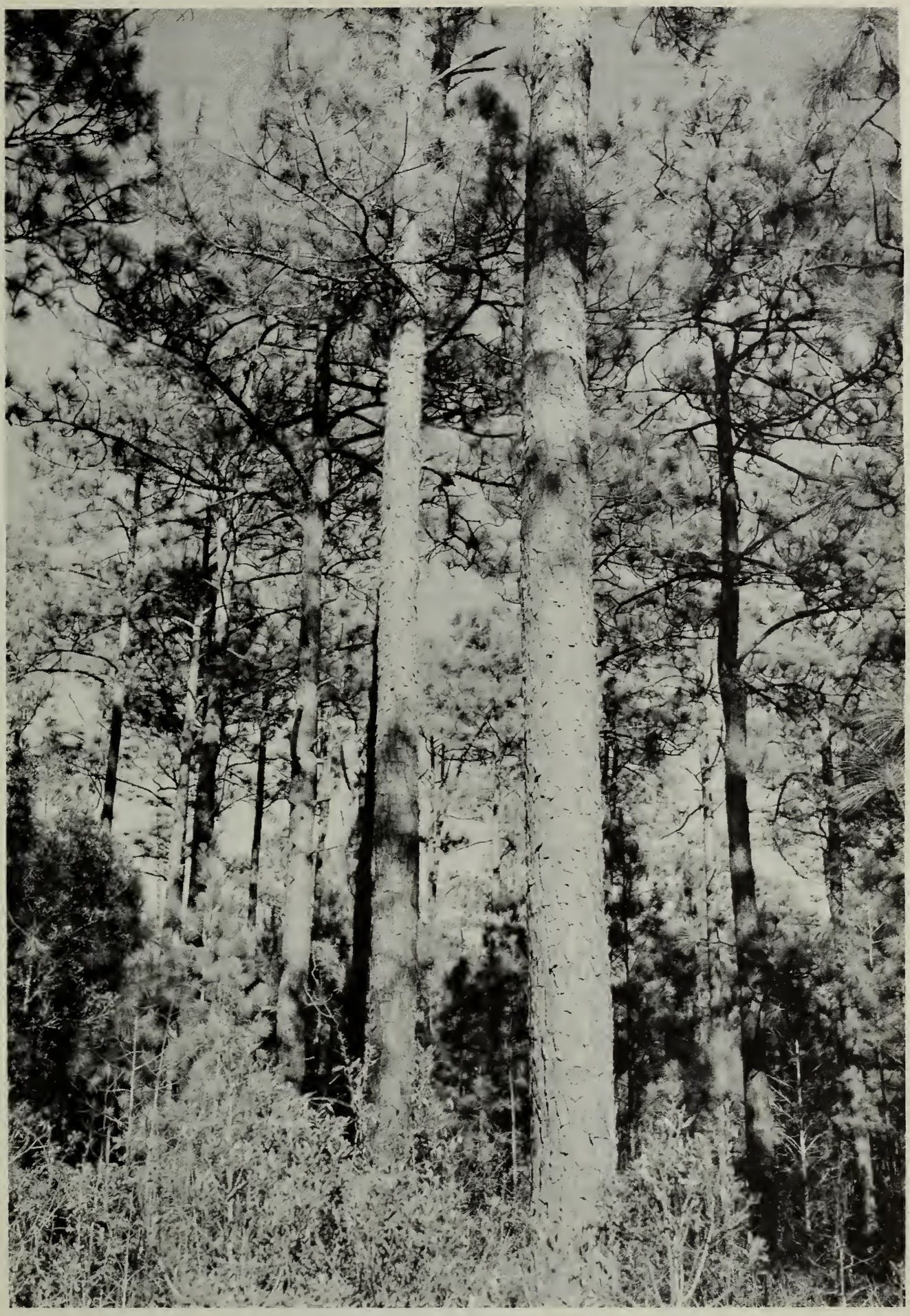

Plate 9 - Site quality affects both quantity and quality of timber production.

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compete severely with pine species or with specific hardwood species selected for management. Intensive treatments such as drainage, prescribed burning, brush cutting, land clearing, disking, or applying herbicides are necessary to eliminate or control competing vegetation or to prepare sites prior to planting seed or seedlings. Where there is no species preference, the hazard is of slight importance since a well-stocked stand of mixed species will be attained.

Mortality of seedlings of the two preferred species, loblolly and slash pine, is severe in depressional areas where excess surface water ponds. Here natural regeneration cannot be relied upon to establish well-stocked stands. Mortality of 50 percent or more of planted seedlings is also expected. Water management is necessary in these areas to utilize these preferred species. Mortality of seedlings of water-tolerant species is usually slight. A survival of 75 percent or more of planted seedlings of these species is expected and stocking can also be attained through natural means if silvicultural conditions are favorable.

Use of equipment is severely restricted, due to poor drainage and ponding. The restriction may endure for more than 3 months during the year. Water management is necessary to provide access and to maintain logging roads.

Windthrow and erosion are not special hazards on these soils.

Woodland Suitability Group No. 18 - Land Resource Area A2

These are deep, poorly drained soils with black surface soils and gray loamy sand to sand subsoils. Infiltration is moderate to rapid ; permeability is very rapid; and water-holding capacity is moderate to low. Organic matter content is low, though in the surface it is high. Natural fertility is low. Mapping units of the following soils are included in this group:

Rutlege loamy sand
Rutlege loamy sand, poorly drained
Rutlege loamy fine sand

These soils are suited to sawtimber and pulpwood rotations. They will produce medium to long poles and piling.

Loblolly pine and slash pine are preferred species. Pond pine, sweetgum, blackgum, tupelo gum, and cypress are also suitable species. Gums, maple, ash, cypress, and sweetbay are primary wildlife food species.

Average site indexes are: loblolly pine 90 $\pm$ 6; longleaf pine 71 $\pm$ 6; slash pine 86; and pond pine 69 $\pm$ 4. Approximate average annual rate of growth per acre (board feet, Scribner) of well-stocked unmanaged stands at 50 years of age is: loblolly pine 560; longleaf pine 240; slash pine 475; pond pine 110.

Other tree species and the undergrowth of briars, switchcane, grass, vines, gallberry, and myrtle compete severely with preferred species or with specific hardwood species selected for management. Intensive treatments such as drainage, prescribed burning, brush cutting, land clearing, disking, or applying herbicides, are necessary to eliminate or control competing vegetation or to prepare sites prior to planting seed or seedlings. Where there is no species preference, the hazard is of slight importance since a well-stocked stand of mixed species will be attained.

Mortality of seedlings of preferred species, loblolly and slash pine, is severe in depressional areas where excess surface water ponds. Natural regeneration cannot be relied upon to establish well-stocked stands of these two species. Mortality of 50 percent or more may be expected when these species are planted. Water management is necessary on these depressional areas if the preferred pine species are to be grown. Mortality of seedlings of water-tolerant species is usually slight on these soils. Adequate stocking by natural means may be expected and a survival of 75 percent or more of planted seedlings of these species is expected.

Use of equipment is severely restricted due to poor drainage and ponding. The restriction may endure for more than three months during the year. Water management is necessary to provide access and to maintain logging roads.

Windthrow and erosion are not special hazards on these soils.

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Woodland Suitability Group No. 19 - Land Resource Area A2

These are very poorly drained soils with black surface soils and clay loam to clay subsoils. Infiltration and permeability are very low and water-holding capacity is high. Organic matter content is high and natural fertility is moderate. They occupy topography that is nearly level or depressed.

Mapping units of the following soils are included in this group:

Bayboro loam
Hyde loam

These soils are suited to sawtimber and pulpwood rotations. They will produce poles and piling of long length.

Loblolly pine and slash pine are preferred species. But with these species water management may be necessary to utilize fully the site potential. Sweetgum, blackgum, tupelo, cypress, red maple, and water-tolerant oaks are also suitable and are primary wildlife food species.

Average site indexes are: loblolly pine 103 $\pm$ 7; and slash pine 106. Approximate average annual growth per acre (board feet, Scribner) of well-stocked, unmanaged stands at 50 years of age is: loblolly pine 740; slash pine 680.

Sweetgum, oaks, hickory, maple, and ground cover vegetation compete severely with the preferred pine species and suitable hardwoods that may be selected for management. Intensive treatments such as water management, prescribed burning, land clearing, disking, brush cutting, or applying herbicides are necessary to eliminate or control competing vegetation or to prepare sites prior to establishing seedlings (Plate 10). Where there is no species preference, the hazard is not important.

Mortality of seedlings of preferred pine species is moderate to severe, due to slow surface runoff or ponding. Water management is frequently necessary to establish seedlings or to plant them with success. Where adequate drainage outlets are not available, water-tolerant species should be selected for management.

The use of equipment is restricted severely by poor drainage, ponding, and texture of the surface. The restriction may be longer than three months during the year. Water management and adequate drainage is necessary to maintain roads and to utilize the site fully. Concentration of grazing and operation of equipment should be avoided to prevent damage to the soil and to tree roots.

Windthrow and erosion are not serious hazards on these soils.

Woodland Suitability Group No. 20 - Land Resource Area A2

These are deep, very friable, very poorly or poorly drained sands, with organic hardpans. Infiltration and permeability are very rapid. Water-holding capacity is low. Organic-matter content and natural fertility are low. Topography is flat to slightly undulating. Mapping units of the following soils are included in this group:

Leon fine sand
St. Johns sand
St. Johns loamy fine sand

Loblolly and slash pine are preferred species. Longleaf and pond pine are suited but are very low producers and are common where fires have occurred frequently. Pond pine predominates where water stands on the surface for long periods.

These soils are adapted to pulpwood and small-sized sawtimber rotations. They produce poles and piling of short lengths. Sweetbay and maple are primary wildlife food species.

Average site indexes at 50 years are: loblolly pine 69; longleaf pine 56 $\pm$ 5; slash pine 69 (estimated); and pond pine 60. Approximate average annual growth per acre (board feet, Scribner) of well-stocked, unmanaged stands at 50 years of age is: loblolly pine 285; longleaf pine 80; slash pine 265; pond pine 70.

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Plate 10 - Regeneration of loblolly pine following control, by girdling, of competing vegetation.

Gallberry, wax myrtle, pygmy oaks, saw palmetto, and other vegetation compete severely with preferred species. Intensive treatments such as water management, prescribed burning, applying herbicides, brush cutting, disking, or land clearing, are necessary to eliminate or control competing vegetation, or to prepare sites prior to establishing seedlings.

Organic hardpan hinders drainage and restricts root development and aeration. Mortality of seedlings or planted trees is severe except where adequate drainage is obtained. Outlets for adequate drainage treatments may not be readily available.

Use of equipment is restricted severely due to the influence of the hardpan and poor drainage. The duration of this restriction is of more than three months during the year.

The hazard from windthrow is moderate, due to the restriction of root development by the hardpan, poor drainage, and poor aeration. Windfall from highest normal wind velocities is expected in exposed areas. This limitation needs to be considered in planning for thinnings, release cuttings, and regeneration or final harvest cuttings.

Erosion is no special hazard on these soils.

Woodland Suitability Group No. 21 - Land Resource Area A2

This is a deep, very poorly drained silt loam soil of the stream floodplains. It is nearly level, with some depressional areas. Infiltration and permeability are slow. Water-holding capacity is high. Organic matter content and natural fertility are moderate. One mapping unit, Wehadkee silt loam, is included.

Loblolly pine, sweetgum, ash, blackgum, tupelo, cypress, and red maple are preferred species. Persimmon, hickory, willow oak, water oak, hackberry, American elm, winged elm, and beech, are species of intermediate preference.

This soil is suited to sawtimber and pulpwood rotations and to the production of high quality veneer and long poles and piling. Most of the species mentioned above are important as sources of wildlife food.

Average site indexes are: loblolly pine 100 (estimated); slash pine 100 (estimated). Site indexes for commercial hardwood species have not been fully determined. Approximate average annual growth per acre (board feet, Scribner) of well-stocked unmanaged stands at 50 years of age is: loblolly pine 700; slash pine 620.

The natural vegetation, composed primarily of hardwoods and ground cover, competes severely with pine. Prescribed burning, applying chemicals, clearing sites, disking, or other intensive treatment is needed to control or eradicate competing vegetation and to prepare seedbeds for restocking to pine. For regeneration of specific hardwoods, the competition hazard may be severe and intensive treatment may be needed. If no particular species is preferred, the hazard is considered slight and a satisfactory stand of mixed hardwoods can be regenerated naturally.

Seedling mortality due to soil influence varies by individual tree species but overflow is generally hazardous to germination of seed and growth of all seedlings. It is therefore considered severe on this soil. Prolonged inundation and silting during the growing season causes severe mortality. Water management improves site quality and reduces mortality, but frequently is not feasible on this soil.

The use of equipment is restricted by overflow and poor drainage. Adequate drainage is needed for roads, but may not be practical on all areas. The use of equipment and grazing should be avoided when these soils are wet, to avoid compaction and damage to tree roots.

Windthrow and erosion are not special hazards on these soils.

A wide variety of species is suited to this soil. The production potential is excellent and justifies intensive treatment that includes the selection of species and improvement of sites. To attain the potential production it is necessary to recognize the requirements of the sites and the treatment needed for each species. Putnam, Furvinal, and McKnight (1960) (21) list approximately 70 important commercial species of the Southern bottomlands and describe important characteristics and site requirements for them.

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Woodland Suitability Group No. 22 - Land Resource Area A2

These are moderately well to poorly-drained soils with high phosphate content, occurring on the lower marine terrace. Infiltration and permeability are moderate to slow. Water-holding capacity is moderate to high. Organic matter content is moderate to high and natural fertility is high.

Mapping units of the following soils are included in this group:

Bladen fine sandy loam, phosphatic
Bladen silty clay loam, phosphatic
Charleston fine sandy loam, phosphatic
Edisto sandy loam, phosphatic
Edisto fine sandy loam, phosphatic
Eulonia fine sandy loam, phosphatic
Hyde clay loam, phosphatic
Meggett fine sandy loam, phosphatic
Meggett loam, phosphatic
Meggett clay loam, phosphatic
Stono fine sandy loam, phosphatic
Stono fine sandy loam, thick surface, phosphatic
Weston fine sandy loam, phosphatic
Weston fine sandy loam, thick surface, phosphatic

These soils are suited to sawtimber and pulpwood rotations. They will produce high quality veneer and poles and piling of long lengths.

Loblolly pine, slash pine, sweetgum, yellow-poplar, ash, cottonwood, black walnut, cherry-bark oak, white oak, cow oak, Shumard oak, red maple, blackgum, and cypress are preferred species and also represent primary wildlife food species.

Average site indexes are: loblolly pine 106 $\pm$ 2; longleaf pine 77; shortleaf pine 95 (estimated); slash pine 106 (estimated). Site indexes for other species have not been determined. Approximate average annual growth per acre (board feet, Scribner) of well-stocked unmanaged stands at 50 years of age is: loblolly pine 785; longleaf pine 310; shortleaf pine 725; slash pine 680.

Competition between pine or selected hardwood species and other trees and by heavy undergrowth of grasses, vines, reeds, gallberry, and wax myrtle is severe. Intensive treatments such as prescribed burning, applying herbicides, water management, land clearing, disking, and furrowing are frequently necessary to eliminate or control competing vegetation or to prepare sites prior to establishing seedlings. Where species preference is not important and intensive site treatments or vegetative controls are not applied, the hazard of competition exists, but becomes insignificant. The composition of the forest will tend to develop toward the more tolerant species.

Mortality of seedlings, except those of species tolerant to water, is severe where water stands in depressions or on poorly drained areas. Water management and other intensive practices are frequently necessary to regenerate selected species. Conversion of mixed hardwood stands to selected hardwood or pine species requires intensive and expensive treatments. Seedling mortality is slight on Edisto, Eulonia, and Stono soils.

There is a moderate to severe restriction in the use of equipment. Water management is frequently necessary to construct and maintain roads. These soils compact easily and tree roots may be damaged by grazing or operation of equipment during wet periods. The hazard is severe in depressions or large flat areas but is regarded as moderate elsewhere on these soils. Excessive wetness, of less than three months' duration, is considered to be a moderate restriction.

Erosion and windthrow are no special hazards on these soils.

Woodland Suitability Group No. 23 - Land Resource Area A2

Five miscellaneous mapping units (land types) are recognized and mapped in the lower coastal plain area and are included in this Woodland Suitability Group. At present they are unimportant for the production of southern pine. With adequate water management, such as drainage and protection from flooding, however, the first two, Swamp and Fresh water

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marsh, will be important for the production of pines. No attempt is made here to provide interpretations in such cases. Likewise, certain hardwood species are important on these two mapping units at present, but no interpretations are provided for them. The last three miscellaneous mapping units, Tidal marsh, firm acid clays; Tidal marsh, soft acid clays; and Coastal beach sands, are not suited to the commercial production of sawtimber.

Swamp
Fresh water marsh
Tidal marsh, firm acid clays
Tidal marsh, soft acid clays
Coastal beach sands

Upper and Middle Coastal Plain (Land Resource Area A3a)

Average site indexes by soil mapping units for soils in the upper and middle coastal plain are included in Table 3. The number of site measurements used to arrive at these average site index values is shown together with the calculated standard deviation where three or more measurements were available. The woodland suitability group to which each soil was assigned for interpretations is also indicated.

Table 4 is a summary of woodland suitability groups and interpretations for the upper and middle coastal plain. Detailed interpretations for each of the 14 woodland suitability groups follow.

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TABLE 3. Average Site Indexes (at 50 years) for Five Southern Pines by Soil Mapping Units in the Upper and Middle Coastal Plain of South Carolina (Land Resource Area A3a) [1]

SOIL MAPPING UNITS			AVERAGE SITE INDEX [5]					WOODLAND SUITABILITY GROUP [6]
SOIL SERIES, TYPE, AND PHASE [2]	SLOPE CLASSES [3]	EROSION CLASSES [4]	LOBLOLLY PINE	LONGLEAF PINE	SHORTLEAF PINE	SLASH PINE	POND PINE	
Americus loamy sand	A	1	86 (2)	68 (2)	61 (1)	-	-	2
Byars clay loam	A	1	104 (1)	-	-	-	-	11
Caroline fine sandy loam and sandy loam	C	1, 2	92 (2)	-	-	-	-	3
Chewacla fine sandy loam	A	1	90 (2)	-	-	-	-	8
Chewacla silt loam	A	1	101±10 (3)	73 (1)	-	-	-	8
Congaree fine sandy loam	A	1	91 (1)	-	-	-	-	5
Congaree silt loam	A	1	109±10 (3)	-	-	-	-	5
Coxville sandy loam and fine sandy loam	A	1	83±6 (5)	78 (1)	-	-	67 (1)	10
Coxville loam and silt loam	A	1	86±7 (7)	70 (2)	-	-	-	10
Dunbar sandy loam	A	1	80 (2)	66 (1)	-	-	-	7
Eustis sand	B**	1	74±5 (5)	64±5 (4)	53 (2)	-	-	1
Eustis sand	D	1	94 (2)	-	-	-	-	1
Eustis sand, terrace	B**	1	86 (1)	70 (1)	-	-	-	1
Eustis sand, shallow	C	1	85±5 (3)	62 (1)	-	-	-	2
Eustis sand, shallow, terrace	A	1	101 (2)	-	-	-	-	2
Flint sandy loam, very fine sandy loam, and silt loam	A	1	81±8 (5)	64 (1)	72 (1)	-	-	6
Flint clay loam	A, B	3	74±4 (3)	-	-	-	-	6
Goldsboro sandy loam	A	1	-	70 (2)	-	-	-	3
Grady fine sandy loam and loam	A	1	91±7 (16)	67±5 (4)	67 (1)	87 (1)	73 (1)	10
Grady clay loam	A	1	90±9 (3)	-	-	-	-	10
Izagora sandy loam	A	1	-	-	-	-	62 (1)	7
Kalmia fine sandy loam	A	1	89 (2)	-	-	-	-	3
Klej sand and loamy fine sand	A	1	81 (2)	-	-	-	-	7
Lakeland sand	B**	1	78±8 (9)	66±4 (10)	-	-	-	1
Lakeland sand	C	1	69 (1)	66 (1)	53 (1)	-	-	1
Lakeland sand, terrace	B**	1	-	74 (1)	-	-	-	1
Lakeland sand, shallow	A	1	76±2 (4)	66±5 (10)	61 (1)	-	-	2
Lakeland sand, shallow	B	1	81±4 (6)	71±5 (7)	73±4 (3)	-	-	2
Lakeland sand, shallow	C	1	-	61 (1)	-	-	-	2
Lakeland sand, shallow	D	1	72 (1)	72 (1)	-	-	-	2
Lakeland sand, shallow	E	1	79 (1)	-	-	-	-	2
Leaf sandy loam	A	1	91±3 (4)	-	-	-	-	9
Leaf very fine sandy loam and silt loam	A	1	95±7 (9)	-	-	-	-	9
Leaf clay loam	A	1	90 (2)	-	-	-	-	9
Local alluvial land, well drained	A, B	1	91±5 (4)	72 (1)	67 (1)	-	-	5
Lynchburg sandy loam and fine sandy loam	A	1	79±3 (4)	72±3 (10)	-	-	70 (1)	7
Magnolia sandy loam	D	1	80 (1)	-	66 (1)	-	-	3
Magnolia sandy clay loam	C	3	82 (2)	-	-	-	-	14
Marlboro fine sandy loam	A, B	1, 2	91 (2)	67 (1)	-	-	-	3
Myatt sandy loam	A	1	-	-	-	-	74 (1)	13
Norfolk sandy loam and loamy sand	A, B	1, 2	80±3 (7)	73±8 (5)	-	-	-	3
Norfolk loamy sand, thick surface	A, B	1	84±6 (7)	67±3 (5)	-	-	-	4

TABLE 3. Average Site Indexes (at 50 years) for Five Southern Pines by Soil Mapping Units in the Upper and Middle Coastal Plain of South Carolina (Land Resource Area A3a) 1|

SOIL MAPPING UNITS			AVERAGE SITE INDEX 5|					WOODLAND SUITABILITY GROUP 6|
SOIL SERIES, TYPE, AND PHASE 2|	SLOPE CLASSES 3|	EROSION CLASSES 4|	LOBLOLLY PINE	LONGLEAF PINE	SHORTLEAF PINE	SLASH PINE	POND PINE	
Okenee loam	A	1		–	–	–	–	72 (2)	12
Orangeburg sandy loam and loamy sand	A, B, D	1, 2		82±6 (5)	66 (1)	62 (1)	–	–	3
Orangeburg loamy sand, thick surface	B	1		66 (1)	65 (1)	–	–	–	4
Orangeburg sandy clay loam	B, C	3		73±5 (3)	–	–	–	–	14
Portsmouth sandy loam, fine sandy loam, and loam	A	1		98±7 (5)	68±4 (7)	–	–	71±7 (3)	12
Rains sandy loam	A	1		83±2 (3)	64 (1)	–	86 (1)	–	7
Ruston sandy loam and fine sandy loam	A, B, C	1, 2		83±1 (4)	77 (1)	80 (1)	–	–	3
Ruston sandy clay loam	B	3		73 (2)	–	–	–	–	14
Ruston loamy sand, thick surface	B	1		74 (1)	–	–	–	–	4
Rutlege loamy fine sand	A	1		85±3 (4)	72±5 (4)	–	–	77 (1)	13
Stough sandy loam	A	1		106 (1)	67 (1)	–	–	–	9
Wahee fine sandy loam and very fine sandy loam	A	1		82±7 (6)	61 (2)	74 (1)	–	–	6
Wahee silt loam	A	1		85±6 (4)	–	–	–	–	6
Wehadkee silt loam	A	1		100±9 (7)	–	–	–	–	11

1| Data summarized from Appendix table 2.

2| Where evidence supported it, certain soil types and phases within soil series were combined for this summary.

3| Slope classes:
- ** A 0 to 2% slopes, nearly level
- ** B 2 to 6% slopes, gently sloping
- C 6 to 10% slopes, sloping
- D 10 to 15% slopes, strongly sloping
- E 15 to 25% slopes, moderately steep
- F 25% and over, steep

4| Erosion classes:
1. None to slight; 75% or more of original surface soil or plow layer (in soils having thin surfaces) remaining.
2. Moderate; approximately 25% to 75% of the original A horizon or surface soil remaining.
3. Severe; more than 75% of the original plow layer or A horizon and up to 25% of the subsoil lost.
4. Moderately gullied; soils have moderately deep or deep gullies occupying 15 to 40% of the area. Area between gullies may have Class 1, 2 or 3 erosion.

5| The average site index value is followed by a plus or minus standard deviation. These were calculated wherever three or more measurements were available.
A dash indicates that the species does not generally occur on the soil or that data are not available.

6| Numbers in this column refer to the woodland suitability group into which the soil was placed.

* The numbers in parentheses indicate the number of measurements available for each soil.

** Slope classes marked by a double asterisk are on well drained sands on which the A and B slopes are combined in mapping, thus forming a B slope of 0 to 6%.

TABLE 4 - WOODLAND SUITABILITY GROUPINGS OF SOILS WITH INTERPRETATIONS FOR MANAGEMENT AND TREATMENT - UPPER AND MIDDLE COASTAL PLAIN OF SOUTH CAROLINA (LAND RESOURCE AREA A3a)

GROUP NO.	SOIL MAPPING UNIT		POTENTIAL SOIL PRODUCTIVITY - SITE INDEX AT 50 YEARS 2/					INTERPRETATIONS FOR WOODLAND CONSERVATION 3/					SUITABLE WOODCROPS
	SOIL SERIES, TYPE, AND PHASE	SLOPE AND EROSION CLASSES 1/	LOBLOLLY PINE	LONGLEAF PINE	SHORTLEAF PINE	SLASH PINE	POND PINE	PLANT COMPETITION	SEEDLING MORTALITY	EQUIPMENT LIMITATIONS	WINDTHROW HAZARD	EROSION HAZARD	
1	Eustis sand Eustis sand, terrace Lakeland sand Lakeland sand, terrace	A-1, B-1, C-1, D-1, E-1	78±7 (17)	67±5 (18)	5[illegible]±7 (3)	78*	-	Severe	Slight to Severe	Slight to Moderate	Slight	Slight to Moderate	Pines
2	Americus loamy sand Eustis sand, shallow Eustis sand, shallow, terrace Lakeland sand, shallow Lakeland sand, shallow, terrace	A-1, B-1, C-1, D-1, E-1	80±5 (17)	70±6 (14)	68±7 (5)	80*	-	Severe	Slight to Moderate	Slight to Moderate	Slight	Slight to Moderate	Pines
3	Caroline fine sandy loam and sandy loam Faceville sandy loam Goldsboro sandy loam Greenville sandy loam Kalmia fine sandy loam Magnolia sandy loam Marlboro fine sandy loam and sandy loam Norfolk sandy loam and loamy sand Orangeburg sandy loam and loamy sand Red Bay sandy loam Ruston sandy loam and fine sandy loam	A-1, B-1, B-2, C-1, C-2, D-1	84±5 (23)	71±7 (10)	69±9 (3)	84*	-	Severe	Slight	Slight to Moderate	Slight	Slight to Moderate	Pines
4	Norfolk loamy sand, thick surface Orangeburg loamy sand, thick surface Ruston loamy sand, thick surface	A-1, B-1	81±8 (9)	66±3 (6)	57- (1)	81*	-	Severe	Slight to Moderate	Slight	Slight	Slight	Pines
5	Congaree fine sandy loam and silt loam Local alluvial land, well drained	A-1, B-1	99±2 (9)	72- (1)	67- (1)	99*	-	Slight or Severe	Slight to Severe	Slight to Moderate	Slight	Slight	Lowland Hardwoods and Pines
6	Flint sandy loam, very fine sandy loam, and clay loam Wahee fine sandy loam, very fine sandy loam, and silt loam	A-1, B-1, C-1, A-3, B-3	80±7 (14)	62±3 (3)	73- (2)	80*	-	Slight or Severe	Slight to Moderate	Slight to Moderate	Slight to Moderate	Slight to Severe	Lowland Hardwoods and Pines
7	Dunbar sandy loam Izagora sandy loam Klej sand and loamy fine sand Lynchburg sandy loam and fine sandy loam Rains sandy loam	A-1	80±3 (11)	71±4 (10)	70- (1)	86- (1)	66- (2)	Severe	Slight to Moderate	Slight to Moderate	Slight	Slight	Pines
8	Chewacla fine sandy loam and silt loam	A-1	101±10 (3)	73- (1)	-	101*	-	Slight or Severe	Moderate to Severe	Moderate to Severe	Slight	Slight	Lowland Hardwoods and Pines
9	Leaf very fine sandy loam, silt loam, and clay loam Roanoke fine sandy loam Stough sandy loam	A-1	94±6 (16)	67- (1)	-	94*	-	Slight or Severe	Slight to Severe	Slight to Moderate	Slight	Slight	Lowland Hardwoods and Pines
10	Coxville sandy loam, fine sandy loam, loam, and silt loam Grady fine sandy loam, loam, and clay loam	A-1	89±7 (31)	69±6 (8)	67- (1)	87- (1)	70- (2)	Moderate to Severe	Slight to Severe	Moderate to Severe	Slight	Slight	Pines and Cypress-Blackgum
11	Byars clay loam Wehadkee silt loam	A-1	101±9 (8)	-	-	-	-	Slight or Severe	Slight to Severe	Severe	Slight	Slight	Lowland Hardwoods and Pines
12	Okenee sandy loam and loam Portsmouth sandy loam, fine sandy loam, and loam	A-1	98±7 (5)	68±4 (7)	-	98*	71±8 (5)	Slight or Severe	Moderate to Severe	Severe	Slight	Slight	Lowland Hardwoods and Pines
13	Myatt sandy loam Plummer sand and loamy sand Rutlege loamy fine sand	A-1	85±3 (4)	72±5 (6)	-	85*	76- (2)	Slight or Severe	Severe	Severe	Slight	Slight	Pond Hardwoods and Pines
14	Caroline clay loam Greenville clay loam Magnolia sandy clay loam Orangeburg sandy clay loam Ruston sandy clay loam	B-3, C-3	75±6 (7)	65*	65*	75*	-	Severe	Slight to Moderate	Moderate	Slight to Moderate	Severe	Pines

1/ Slope Classes: A = 0 to 2 percent, nearly level; B = 2 to 6 percent, gently sloping; C = 6 to 10 percent, sloping; D = 10 to 15 percent, strongly sloping; E = 15 to 25 percent, moderately steep; F = 25 percent and over, steep.

Erosion Classes: 1 = none to slight (up to 25 percent of surface soil removed)
2 = moderate (25 to 75 percent of surface soil removed)
3 = severe (75 percent or more of surface soil and up to 25 percent of subsoil removed)

2/ Average site index was calculated from measurements made on all soil mapping units included in each group. Standard deviations are shown when three or more measurements were available. Numbers in parentheses indicate number of plots sampled. A dash indicates the species is generally not suited to the soils in this group or data was insufficient to make calculations.

3/ See text for definitions of these items.

* Site index values marked by an asterisk have been supplied based on experience, judgement and other measurements.

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Woodland Suitability Group No. 1 - Land Resource Area A3a

These are deep, very friable, excessively drained sands of the uplands and stream terraces. Infiltration and permeability are rapid and water-holding capacity is very low. Organic matter content and natural fertility are low. Mapping units of the following soils are included:

Eustis sand
Eustis sand, terrace
Lakeland sand
Lakeland sand, terrace

Longleaf, slash, and loblolly pines are preferred species. Shortleaf pine is not a preferred species but may be considered.

With preferred species these soils are suited for sawtimber and pulpwood rotations and for the production of poles and piling of medium and short lengths. Where shortleaf pine is grown these soils are suited mainly for pulpwood rotation. Arizona cypress and red cedar are suited to the production of Christmas trees and as understory species for windbreak plantings where they are needed. Cherry laurel is suited as an understory and overstory species in windbreaks. The important commercial hardwood species are not suited to these soils. Persimmon, hickory, gums, and oaks are primary wildlife food species but acorn production is restricted by low moisture supply.

Average site indexes for these soils are: loblolly pine 78 $\pm$ 7; longleaf pine 67 $\pm$ 5; shortleaf pine 53 $\pm$ 7; and slash pine 78 (estimated). On slopes greater than 6 percent (slope classes C, D, and E), with favorable moisture supply site index ranges up to 10 points higher than averages shown. On dry slopes, greater than 6 percent, site index may be 10 points less than the average shown. Approximate average annual growth per acre (board feet, Scribner) of well-stocked, unmanaged stands at 50 years of age is: loblolly pine 400; longleaf pine 190; shortleaf pine 120; slash pine 385.

Blackjack oak, turkey oak, bluejack oak, post oak, water oak, live oak, red oak, hickory, sassafras, persimmon, sweetgum, blackgum, wiregrass, and other vegetation if present compete severely with the preferred species. Intensive treatments such as furrowing, disking, land clearing, brush cutting, undercutting root systems, prescribed burning, or application of herbicides, are frequently necessary to eliminate or control competing vegetation or to prepare sites for adequate regeneration.

High surface temperatures and limited moisture supply cause seedling mortality where surface cover is absent. Where slopes do not exceed 6 percent, the expected survival of planted seedlings, ranges from 50 to 75 percent. Light seedbed preparation is desirable to insure adequate natural restocking. Where slopes exceed 6 percent the hazard of seedling mortality ranges from slight to severe, depending upon the moisture supply. When the topography is rolling and hummocky, ridges and slopes are usually dry and mortality of seedlings is expected to exceed 50 percent of planted stock. Superior planting techniques, high quality seedlings, and replanting, are usually necessary to establish adequate stands. Natural regeneration cannot be relied upon to produce well-stocked stands of preferred species, due to the limited available moisture. Similar mortality is also expected on smooth slopes which are dry.

On slopes exceeding 6 percent, but occupying positions between relatively lower topography and higher topography with seepage effects, the expected mortality of seedlings is slight, due to favorable moisture conditions. The productive potential of such sites is higher also.

The use of equipment is not generally restricted on these soils except where slopes exceed 15 percent (E slopes) where the restriction is considered moderate. These soils have loose sandy surfaces and light, rubber-tired vehicles have poor traction. Heavy equipment is not well supported and requires extra power to operate. These sands are abrasive and cause wear on equipment during normal operations.

Trees are not generally subject to windthrow on these soils.

Due to the thickness of the surface soil, the erosion hazard is slight. Furrowing on steep slopes should follow the contour to minimize soil movement and silting damage to seedlings planted in furrows. Soil blowing may be a serious problem in open areas during

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spring months. Protection by windstrips may be necessary to establish seedlings.

The effects of the Nantucket pine tip moth *(Rhyacionia frustrana)* on loblolly pine are severe on these soils.

Fomes annosus, a root rot fungus, attacks a variety of conifers and results are serious when infections occur on these soils. Root injury by equipment, livestock, fire, etc., invites attacks by this fungus.

Nematodes sometimes occur on sandy soils, especially soils that have been used as cropland. They may severely affect seedlings of susceptible species on these soils.

Woodland Suitability Group No. 2 - Land Resource Area A3a

These are deep, very friable, well drained sands and loamy sands, with loamy sand subsoil at a depth of 30 to 42 inches. Infiltration and permeability are rapid and water-holding capacity is low. Organic matter content and natural fertility are low. Moisture supply is generally more favorable on stream terrace sites than on other upland sites. Mapping units of the following soils are included:

Americus loamy sand
Eustis sand, shallow
Eustis sand, shallow terrace
Lakeland sand, shallow
Lakeland sand, shallow terrace

Slash, loblolly, and longleaf are preferred pine species but shortleaf pine is also suitable. These soils are suited for pulpwood and sawlog rotations and for production of poles and piling of medium lengths. Arizona cypress and red cedar are suited for Christmas trees and for understory planting in windbreaks. Cherry laurel is suited for windbreaks. Commercial hardwood species are not generally suited to these soils. Dogwood, persimmon, gums, oaks, and hickory are primary wildlife food species. Acorn production is generally higher on the stream terrace sites than on the other due to more favorable moisture supply.

Average site indexes for these soils are: loblolly pine 80 $\pm$ 5; longleaf pine 70 $\pm$ 6; shortleaf pine 68 $\pm$ 7; and slash pine 80 (estimated). These soils contain more fine material than the soils in Suitability Group No. 1 and moisture supply is more favorable. Approximate average annual growth per acre (board feet, Scribner) of well-stocked, unmanaged stands at 50 years of age is: loblolly pine 425; longleaf pine 230; shortleaf pine 330; and slash pine 410.

Blackjack oak, post oak, water oak, willow oak, white oak, live oak, red oak, hickory, dogwood, sassafras, persimmon, blackgum, wiregrass, turkey oak, bluejack oak, and sandhills post oak compete severely with preferred species. Intensive treatments such as furrowing, disking, land clearing, brush cutting, undercutting root systems, prescribed burning, or application of herbicides, are frequently necessary to eliminate or control competing vegetation or to prepare sites for regeneration purposes.

On dry slopes exceeding 10 percent (D, E, and F slope classes), seedling mortality is considered moderate. Natural restocking of abandoned fields or open areas may not be adequate due to limited soil moisture, and planting may be necessary to secure a well stocked stand without delay. Prescribed planting and site preparation are beneficial. A survival of 50 to 75 percent of planted seedlings can be expected and some replanting to fill in large openings may be necessary. On other soils in this group seedling mortality is considered slight.

The use of equipment is not generally restricted on these soils, except where slopes exceed 15 percent (slope class E). These soils have loose, sandy surfaces and light, rubber-tired vehicles have poor traction. Heavy equipment is not well supported and requires extra power to operate. These sands are abrasive and cause wear on equipment during normal operations.

Trees are not normally subject to windthrow on these soils.

The erosion hazard is slight to moderate. Soil blowing may be a serious problem in open areas during spring months. Protection by windstrips may be necessary to establish seedlings (Plate 11).

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Plate 11 - Planted windbreak protects pine seedlings in nursery beds.

The effects of the Nantucket pine tip moth *(Rhyacionia frustrana)* on loblolly pine are severe on these soils.

Fomes annosus, a root rot fungus, attacks a variety of conifers and effects are serious when it occurs on these soils.

Nematodes sometimes occur on sandy soils, especially soils that have been used as cropland. They can severely affect seedlings of susceptible species on these soils.

Woodland Suitability Group No. 3 - Land Resource Area A3a

These are deep, well-drained sandy loams and loamy sands with sandy loam to sandy clay subsoils. The Goldsboro soils are moderately well drained. The topography is nearly level to strongly sloping. Infiltration is moderate to rapid; permeability is moderate; and water-holding capacity is moderate to high. Organic matter content and natural fertility are moderate. Mapping units of the following soils are included:

Caroline fine sandy loam
Caroline sandy loam
Faceville sandy loam
Goldsboro sandy loam
Greenville sandy loam
Kalmia fine sandy loam
Magnolia sandy loam
Marlboro fine sandy loam
Marlboro sandy loam
Norfolk sandy loam
Norfolk loamy sand
Orangeburg sandy loam
Orangeburg loamy sand
Red Bay sandy loam
Ruston sandy loam
Ruston fine sandy loam

Loblolly and slash pines are preferred species, but longleaf and shortleaf pines are also suitable. Black walnut is suited to these soils though the site is not optimum. These soils are favorable to sawlog and pulpwood rotations and will produce poles and piling of medium length. Cherry laurel, red cedar, Arizona cypress, and ligustrums are suited as understory for windbreak plantings. These soils are favorable to oaks, hickories, black cherry, mulberry, and other wildlife food-producing species.

Average site indexes are: loblolly pine 84 $\pm$ 5; longleaf pine 71 $\pm$ 7; shortleaf pine 69 $\pm$ 9; and slash pine 84 (estimated). On slopes greater than 6 percent, with favorable moisture supply, site index may be higher than average site indexes shown. Approximate average annual growth per acre (board feet, Scribner) of well-stocked, unmanaged stands at 50 years of age is: loblolly pine 475; longleaf pine 240; shortleaf pine 345; and slash pine 455.

Red oak, white oak, water oak, sassafras, dogwood, persimmon, sweetgum, hickory, and other vegetation, compete severely with pine species. Intensive treatments such as furrowing, land clearing, disking, prescribed burning, brush cutting, undercutting root systems, or applying herbicides, are frequently necessary to eliminate or control competing vegetation or to prepare sites for regeneration.

Satisfactory stocking is generally obtained from a first planting - seedling mortality due to soil influences being slight. If adequate sources of seed are available and competing vegetation is controlled, well-stocked stands may be obtained by natural regeneration.

There is a moderate restriction in the use of equipment on local eroded areas and on steep slopes (classes C and D). Otherwise no restriction is recognized. Operation of equipment on eroded sites should be avoided during wet seasons, to prevent damage to soil structure and to tree roots.

Windfall is no special problem.

There is a slight to moderate erosion hazard on these soils. Operations which disturb protective cover should be avoided. Roads and firebreaks should follow the contour

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as much as possible, to minimize this hazard. Soil blowing occurs in large open areas. Protective cover, such as Abruzzi rye, may be necessary to protect seedlings planted for windbreaks.

The effects of attacks on loblolly pine by the Nantucket pine tip moth *(Rhyacionia frustrana)* are severe, especially on the loamy sand soils. Nematode injury to seedlings may be severe on this group of soils.

Woodland Suitability Group No. 4 - Land Resource Area A3a

These are deep, well-drained, friable soils with thick loamy sand surface soils and sandy loam to sandy clay loam subsoils. Infiltration is rapid, permeability is high, and water-holding capacity is moderate. Organic matter content and natural fertility are moderate to low. Mapping units of the following soils are included:

Norfolk loamy sand, thick surface
Orangeburg loamy sand, thick surface
Ruston loamy sand, thick surface

Loblolly and slash pines are preferred species but longleaf and shortleaf pine are also suited. These soils are adapted to sawtimber and pulpwood rotations and the production of poles and piling of medium length. Cherry laurel, red cedar, Arizona cypress and ligustrums are suited as understory species in windbreaks. Persimmon, mulberry, dogwood, pecan, black cherry, oaks, and hickories are primary wildlife food species.

Average site indexes are: loblolly pine 81 $\pm$ 8; longleaf pine 66 $\pm$ 3; shortleaf pine 57; slash pine 81 (estimated). Approximate average annual growth per acre (board feet, Scribner) of well-stocked, unmanaged stands at 50 years of age is: loblolly pine 440; longleaf pine 180; shortleaf pine 170; and slash pine 420.

Upland oaks, hickory, dogwood, and other vegetation compete severely with pine species. Land clearing, disking, furrowing, undercutting root systems, prescribed burning, brush cutting, or applying herbicides, is frequently necessary to eliminate or control competing vegetation or to prepare sites for regeneration.

Generally, the loss of planted seedlings is less than 25 percent (slight) but occasionally ranges from 25 to 50 percent (moderate). Some replanting may be necessary to fill in the larger openings. Natural reseeding is usually adequate when sites are prepared, competing vegetation is controlled, and seed sources are adequate.

Equipment can generally be operated without restriction or damage to tree roots and without encouragement to erosion. Windthrow is no special hazard.

The hazard of erosion is slight but some soil blowing occurs in large open areas. When planting seedlings for windbreaks, it may be necessary to provide cover such as Abruzzi rye to protect them against soil blowing.

Woodland Suitability Group No. 5 - Land Resource Area A3a

These are deep, nearly level, moderately well to well drained alluvial soils with fine sandy loam and silt loam surfaces and subsoils. They occur on river fronts and on higher elevations of alluvial flood plains and in depressions in the uplands. They are subject to occasional overflow. Infiltration is slow, permeability is moderate and water-holding capacity is moderate. Moisture supply is favorable for tree growth. Organic matter content and natural fertility are medium. Mapping units of the following soils are included:

Congaree fine sandy loam
Congaree silt loam
Local alluvial land, well drained

Sweetgum, yellow-poplar, blackgum, ash, sycamore, cottonwood, black walnut, red maple, cherrybark oak, Shumard oak, white oak, cow oak, loblolly pine, and slash pine are preferred species. Other adapted species include hackberry, beech, birch, American elm, winged elm, hickory, magnolia, post oak, water oak, willow oak, persimmon, mulberry, dogwood, red cedar, and honey locust.

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These soils are suited to sawtimber and pulpwood rotations and to production of high quality veneer and long length poles and piling. Most of the species mentioned above are primary wildlife food species.

Average site indexes are: loblolly pine 99 ± 2; longleaf pine 72; shortleaf pine 67, and slash pine 99 (estimated). Approximate average annual growth per acre (board feet, Scribner) of well-stocked, unmanaged stands at 50 years of age is: loblolly pine 685; longleaf pine 250; shortleaf pine 315; and slash pine 610.

Competition between species and from undergrowth of grasses, vines, and reeds is severe, particularly for intolerant species. Intensive treatments such as land clearing, disking, furrowing, brush cutting, prescribed burning, or application of herbicides, are necessary to eliminate or control competing vegetation or to prepare sites for establishing pine and selected hardwoods. Where species preference is not important and intensive site treatments or controls on vegetation are not applied, the hazard of competition exists but becomes insignificant. The composition of forest stands develops toward the more tolerant species.

Seedling mortality on this group of soils is regarded as slight to severe. Restocking of fields or areas where competing vegetation is controlled is generally satisfactory, assuming seed sources are adequate or that proper techniques are used when planting seed or seedlings. Mortality of planted seedlings is usually less than 25 percent. Periods of overflow are generally short in duration but regeneration of some species may be adversely affected by occasional prolonged inundation, and by silting.

When wet, these fine textured soils will puddle and pack. Tillage, use of equipment, or concentration of cattle, should be avoided during wet periods to prevent damage to the soil structure and to tree roots. Occasional overflows restrict access and use although equipment limitations on these soils are regarded as slight to moderate. Usually the season of restriction is less than three months during the year.

Erosion and windthrow are not special hazards on these soils.

During prolonged drought sweetgum or other species may suffer "dieback".

Woodland Suitability Group No. 6 - Land Resource Area A3a

These are moderately deep, moderately well to somewhat poorly drained soils with silty clay to clay subsoils through which water moves slowly. Texture of the surface soil ranges from sandy loam to clay loam. These soils occur on stream terraces and are subject to occasional overflow. Infiltration and permeability are slow. Water-holding capacity is high. Organic matter content and natural fertility are moderate.

Mapping units of the following soils are included:

Flint sandy loam
Flint very fine sandy loam
Flint silt loam
Flint clay loam
Wahee fine sandy loam
Wahee very fine sandy loam
Wahee silt loam

Preferred species include loblolly pine, slash pine, sweetgum, blackgum, ash, white oak, cherrybark oak, cow oak, Shumard oak, red maple, and yellow poplar. Some of the preferred species are important wildlife food species.

These soils are suited to sawtimber and pulpwood rotations and to production of veneer and medium length poles and piling.

Average site indexes are: loblolly pine 80 ± 7; longleaf pine 62 ± 3; shortleaf pine 73; and slash pine 80 (estimated). Approximate average annual growth per acre (board feet, Scribner) of well-stocked, unmanaged stands at 50 years of age is: loblolly pine 430; longleaf pine 140; shortleaf pine 400; and slash pine 410.

Plant competition is severe for pines and intolerant hardwoods which are preferred species. Intensive treatments such as land clearing, disking, brush cutting, prescribed burning, or applying herbicides, frequently are necessary to eliminate or control competing vegetation

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and to prepare sites prior to regeneration. Where there is no species preference, the hazard is regarded as slight and usually a well-stocked stand of mixed species will develop.

Mortality of seedlings is expected to be slight except on local, severely eroded sites or on areas flooded for long periods during the growing season. In such cases, mortality is considered as moderate and loss of from 25 to 50 percent of planted seedlings may be expected. This may require replanting to fill in large openings. Inundation during the growing season reduces growth or causes mortality of some preferred species. Flooding also interferes with germination of seed.

Equipment limitations are classed as slight to moderate on these soils. Soils with silt loam and clay loam surfaces puddle and pack easily. Concentration of livestock or operation of equipment during wet periods should be avoided. Damage to tree roots and soil structure by compaction may be severe. Overflow interferes with the management and use of the soils in this group. Also, certain types of equipment or tools are difficult to use during drought. Water management is needed to facilitate operations and to maintain roads. Overflow and debris may interfere with drainage ditches and structures.

A moderate degree of windthrow is expected on the severely eroded soils since little or no original surface soil remains and root development is restricted by the subsoil. On the other soils the hazard is considered slight.

The hazard of additional erosion is severe on the severely eroded soils as little or no original surface soil remains. Operations or constructions which disturb protective ground cover should be avoided on them if possible. Otherwise this hazard is regarded as slight to moderate.

Dieback of hardwoods on these soils may occur during drought.

Woodland Suitability Group No. 7 - Land Resource Area A3a

These are nearly level, somewhat poorly to poorly drained soils and, with the exception of Klej, have sandy loam surface soils and sandy loam to sandy clay loam subsoils. Klej soils have loamy sand surfaces and loamy sand to sand subsoil. Infiltration and permeability are moderate to rapid and water-holding capacity is moderate to low. Mapping units of the following soils are included:

Dunbar sandy loam
Izagora sandy loam
Klej sand
Klej loamy fine sand
Lynchburg sandy loam
Lynchburg fine sandy loam
Rains sandy loam

Loblolly pine and slash pine are preferred, but shortleaf and longleaf pine are also suitable. Pond pine, a less desirable species, occurs frequently, due primarily to previous fires and poor drainage. These soils are favorable to sawtimber and pulpwood rotations and will produce poles and piling of medium lengths. Pond pine will produce small sawtimber and pulpwood. Oaks, maple, and gum are important wildlife food species.

Average site indexes are: loblolly pine 80 $\pm$ 3; longleaf pine 71 $\pm$ 4; shortleaf pine 70; slash pine 86; and pond pine 66. Approximate average annual growth (board feet, Scribner) per acre in well-stocked, unmanaged stands at 50 years of age is: loblolly pine 425; longleaf pine 240; shortleaf pine 360; slash pine 475; and pond pine 100.

Expected plant competition is severe. Water oak, willow oak, sweetgum, maple, gallberry, myrtle, saw palmetto, wiregrass, briars, and other vegetation compete severely with preferred species. Intensive treatments such as land clearing, disking, brush cutting, prescribed burning, and applying herbicides, are necessary to eliminate or control competing vegetation.

Mortality of seedlings due to soil influence is generally expected to be slight. However, in poorly drained areas and depressions, mortality is moderate, ranging from 25 to 50 percent of planted seedlings due to excess surface water. Replanting may be necessary to fill in large openings. Natural regeneration of preferred species cannot always be relied upon. Site preparation, including water management, may be used to improve survival.

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Limitation of the use of equipment is slight on the somewhat poorly drained soils. There is a moderate restriction in the use of equipment and grazing on the poorly drained soils. Operation of machinery or concentration of cattle should be avoided during wet periods, to prevent damage to soil structure and to tree roots. Water management reduces this hazard, especially where these soils occur in extensive areas.

Windthrow and erosion are not special hazards.

Woodland Suitability Group No. 8 - Land Resource Area A3a

These are nearly level, deep, somewhat poorly to moderately well drained fine sandy loams and silt loams of the alluvial floodplains of streams flowing from the Piedmont. Infiltration, permeability, and water-holding capacity are moderate. Organic matter content and natural fertility are moderate. These soils are subject to frequent flooding. Mapping units of the following soils are included:

Chewacla fine sandy loam
Chewacla silt loam

Sweetgum, blackgum, cherrybark oak, cow oak, Shumard oak, white oak, ash, yellow-poplar, cottonwood, loblolly pine, cypress, and red maple are preferred species. The following species are of intermediate priority: willow oak, water oak, post oak, hackberry, American elm, winged elm, hickory, American beech, persimmon, and mulberry. Weed species include boxelder, blue beech, hophornbeam, and hawthorn.

These soils are suited to sawtimber and pulpwood rotations and to the production of high quality veneer and long length poles and piling. Most of the species mentioned above are important wilflife food species.

Average site indexes are: loblolly pine 101 $\pm$ 10; longleaf pine 73; and slash pine 101 (estimated). Average site indexes for other species have not been determined. Preliminary field studies indicate site index of sweetgum may be similar to site index of loblolly pine. Approximate average annual growth (board feet, Scribner) per acre in well-stocked, unmanaged stands at 50 years of age is: loblolly pine 715; longleaf pine 265; and slash pine 630.

The natural vegetation, composed primarily of hardwood trees and ground cover, competes severely with pine species. Also, when one attempts to regenerate specific hardwood species, he finds the hazard of plant competition severe, especially when he selects intolerant species for management. Prescribed burning, applying herbicides, land clearing, disking, or other intensive treatment, is necessary to control or eliminate competing vegetation and to prepare seedbeds. Where no species preference exists, the hazard of competition is slight and a well-stocked stand of mixed species can be expected.

Seedling mortality varies by tree species and is considered moderate to severe. Overflow is hazardous to germination of seeds and growth of seedlings of both pines and hardwoods. Prolonged inundation and silting may occur during the growing season and are quite detrimental to germination and to growth of seedlings. Water management improves site quality and reduces mortality, but frequently is not feasible.

Equipment limitations are considered to be moderate to severe on these soils. The use of equipment is restricted by overflow and poor drainage due to fine texture of the surface soil, permeability, and topographic position of these soils. Adequate drainage is necessary to maintain roads. Use of equipment and concentration of livestock should be avoided as these soils puddle and pack easily and damage to tree roots results. Water management facilitates access and operations, but overflow and debris interfere with drainage and water control structures.

Erosion and windthrow are not special hazards.

Dieback of hardwoods may occur during drought.

A wide variety of species is suited to these soils.

The production potential is high but intensive treatments such as site improvement by water management and selection of species may be required to attain it. It is necessary to evaluate the requirements of the site as related to the selected species. Appropriate treatments can then be devised. Putnam, Furnival, and McKnight (1960) (21) list approx-

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imately 70 important commercial species of the Southern bottomlands and describe important characteristics and site requirements for them.

Woodland Suitability Group No. 9 - Land Resource Area A3a

These are flat to nearly level, poorly drained soils with fine sandy loam to clay loam surface soils and silty clay to clay subsoil. Stough sandy loam is an exception in that it is somewhat poorly drained. They occur on stream terraces and are subject to frequent flooding. Infiltration and permeability are slow and water-holding capacity is high. Organic-matter content and natural fertility are moderate. Mapping units of the following soils are included:

Leaf very fine sandy loam
Leaf silt loam
Leaf clay loam
Roanoke fine sandy loam
Stough sandy loam

Loblolly pine and slash pine are preferred conifers. Preferred hardwoods include yellow-poplar, sweetgum, cherrybark oak, white oak, cow oak, blackgum, ash, and red maple. These soils are suited to sawtimber and pulpwood rotations and to the production of long length poles and piling and high quality veneer. Hardwood species on these sites produce excellent wildlife food.

Average site indexes are: loblolly pine 94 $\pm$ 6; longleaf pine 67; and slash pine 94 (estimated). Approximate average annual growth (board feet, Scribner) per acre of well-stocked, unmanaged stands at 50 years of age is: loblolly pine 610; longleaf pine 190; and slash pine 560.

Competition by undesired species and by ground vegetation is severe with preferred species, particularly with intolerant species selected for management. Intensive treatment such as land clearing, disking, furrowing, brush cutting, prescribed burning, or application of herbicides, is necessary to control or eradicate competing vegetation and to prepare sites prior to planting or natural regeneration. Where species preference is not important the hazard becomes insignificant and generally a stand of mixed species will develop.

Expected mortality of seedlings due to soil influences is generally less than 25 percent of planted stock. However, during some seasons, sites may be inundated for long periods during the growing season, during germination, or immediately after germination, and mortality of seedlings may be very severe (over 75 percent) necessitating replanting. Superior planting techniques can be employed to minimize these chances of severe mortality. Water management is beneficial where practical, to assure both good survival of planted stock and adequate natural regeneration, it also benefits growth of established plants.

Equipment limitations are moderate on the soils with fine textured surface layers. Otherwise no limitations of significance are recognized. Drainage is usually needed to maintain roads and facilitate access. Concentration of cattle and operation of equipment should be avoided during wet seasons and following flooding to prevent damage to soil structure and tree roots, especially on the finer textured soils.

Erosion and windthrow are not special hazards.

Woodland Suitability Group No. 10 - Land Resource Area A3a

These are poorly to very poorly drained soils with sandy loam to clay loam surface soils and sandy clay to clay subsoils. Infiltration and permeability are slow and water-holding capacity is high. Organic matter content and natural fertility are moderate. Topography is nearly level. In slight depressions water may stand on the surface for long periods. Mapping units of the following soils are included:

Coxville sandy loam
Coxville fine sandy loam
Coxville loam
Coxville silt loam
Grady fine sandy loam
Grady loam
Grady clay loam

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When drainage is adequate, loblolly and slash pines are preferred species for sawtimber and pulpwood rotations. Longleaf, shortleaf, and pond pines are also suitable. These sites have the potential to produce medium to long length poles and piling. Where drainage is inadequate for pine species, blackgum and cypress are preferred but sweetgum and maple are also suited. Quality of timber on these poorly drained sites will be inferior to that of the same species on alluvial floodplains.

Average site indexes are: loblolly pine 89 $\pm$ 7; longleaf pine 69 $\pm$ 6; shortleaf pine 67; slash pine 87; and pond pine 70. Site indexes for cypress and hardwoods have not been determined. Approximate average annual growth (board feet, Scribner) per acre of well-stocked unmanaged stands at 50 years of age is: loblolly pine 545; longleaf pine 215; shortleaf pine 315; slash pine 485; and pond pine 115.

Plant competition is considered to be moderate to severe. Sweetgum, maple, holly, ironwood, elm, gallberry, myrtle, briars, and sedges compete severely with pine species. Intensive treatments such as water management, prescribed burning, land clearing, brush cutting, and applying herbicides, are necessary to eliminate or control competing vegetation prior to establishing seedlings. In poorly drained areas where cypress and hardwood species are preferred, plant competition is moderate. Establishment and growth of seedlings or sprouts may be delayed and some moderately intensive site preparation or selective control measures are beneficial.

Mortality of seedlings due to soil condition varies from slight on the higher sites to severe on the lower, very poorly drained, depressional sites, where water stands on the surface for long periods. Some lower areas of these soils are practically treeless due partly to seedling mortality and partly to previous cuttings and severe fires during droughts. Water management is frequently necessary for success with planted seedlings or in establishing adequate stands of preferred species naturally.

Equipment limitations are regarded as severe to moderate. Water management is required in depressional areas to permit access and to maintain roads. Concentration of livestock and operation of equipment should be avoided on low areas to prevent soil compaction and damage to tree roots. On higher sites, the limitation in the use of equipment or in grazing is moderate.

Windthrow and erosion are not special hazards.

Woodland Suitability Group No. 11 - Land Resource Area A3a

These are very poorly drained alluvial soils with silt loam to clay loam surface soils and silt loam to silty clay loam subsoils. Infiltration and permeability are slow and water-holding capacity is high. Organic matter content is moderate. Natural fertility is moderate to high. These soils are subject to frequent flooding. Mapping units of the following soils are included:

Byars clay loam
Wehadkee silt loam

Preferred species include loblolly pine, sweetgum, ash, blackgum, tupelo, cypress, and red maple. Persimmon, hickory, willow oak, water oak, elm, and beech are of intermediate priority.

These soils are suited to sawtimber and pulpwood rotations and to the production of high quality veneer and long length poles and piling. Many of the hardwood species are important wildlife food species.

Average site index of loblolly pine is 101 $\pm$ 9. Average site indexes for hardwoods have not been determined. Approximate average annual growth per acre (board feet, Scribner) of well-stocked unmanaged stands at 50 years of age is: loblolly pine 710.

Natural vegetation, composed of hardwoods and ground vegetation, competes severely with pines. Also, when attempting to regenerate specific hardwood species, the hazard of plant competition is severe, particularly when intolerant hardwoods are selected for management. Prescribed burning, applying herbicides, land clearing, disking, or other intensive treatment is necessary to control or eradicate competing vegetation and to prepare seedbeds. Where no species preference exists, the hazard of competition is regarded as slight and a well-stocked stand of mixed species can be expected.

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Seedling mortality due to soil influences varies by individual tree species from slight to severe. Poor drainage and overflow are hazardous to germination of seeds and growth of seedlings of conifers and hardwoods. Prolonged inundation and silting during the growing season cause severe mortality to recently germinated seedlings. Water management improves site quality and reduces mortality but frequently is not feasible.

Equipment limitations are considered to be severe on these soils. Poor drainage, high water table, and overflow severely restrict the use of equipment. These soils, due to fine texture of the surface soil, are boggy and slippery when wet. They puddle and compact easily and tree roots may be severely damaged by equipment use or by livestock trampling. Concentration of cattle and use of equipment should be avoided when these soils are wet. Drainage is needed to maintain roads but may not be feasible.

Windthrow and erosion are not special hazards.

A wide variety of species is suited to these soils. The production potential is excellent and justifies intensive treatment which includes selection of species and improvement of the site by drainage. To attain the potential of these sites, it is necessary to recognize the requirements of the sites and the treatment needed for each species. Putnam, Furnival, and McKnight (1960) (21) list approximately 70 important species of the Southern bottomlands and describe important characteristics and site requirements for them.

Woodland Suitability Group No. 12 - Land Resource Area A3a

These are very poorly drained soils with black surface soils high in organic matter and gray sandy loam to clay loam subsoils. Infiltration is moderate to high. Permeability and water-holding capacity are moderate. Organic matter content is high and natural fertility is moderate. The topography is nearly level to slightly depressional. Mapping units of the following soils are included:

Okenee sandy loam
Okenee loam
Portsmouth sandy loam
Portsmouth fine sandy loam
Portsmouth loam

Where drainage is adequate, loblolly or slash pines are preferred species for sawtimber or pulpwood rotations. Pond pine and longleaf pine are also suitable. Where drainage is inadequate for preferred pine species, sweetgum, blackgum, tupelo, maple, or cypress are suitable species.

These sites, adequately drained, are very productive pine sites and are capable of producing high quality sawtimber or poles and piling of long lengths.

Average site indexes are: loblolly pine 98 $\pm$ 5; longleaf pine 68; slash pine 98 (estimated); and pond pine 71 $\pm$ 8. Site indexes were not determined for cypress nor hardwoods. Average annual growth (board feet, Scribner) per acre of well-stocked unmanaged stands at 50 years of age is: loblolly pine 670; longleaf pine 205; slash pine 600; and pond pine 120.

Plant competition on these soils is regarded as slight or severe. Water oak, willow oak, maple, sweetgum, blackgum, gallberry, myrtle, bay, briars, and other ground vegetation compete severely with preferred species. Intensive treatments such as water management, prescribed burning, land clearing, disking, brush cutting, or applying herbicides is necessary to control or eliminate competing vegetation and prepare the site for establishing seedlings of preferred species. Where species preference is not important, the hazard is considered slight.

Mortality of seedlings is severe in ponded areas. Water management is frequently necessary to secure adequate natural or artificial stocking of desired species. On areas where water does not pond, mortality of seedlings is expected to be from 25 to 50 percent (moderate) of planted stock and replanting may be necessary to fill in large openings. Natural regeneration cannot be relied upon to establish stands of desired species unless sites are prepared.

Equipment limitations are severe due to the fine texture of surface soil, and to poor drainage. Water management is required to permit access and management and to maintain

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roads. Concentration of livestock and equipment use during wet periods should be avoided to prevent puddling, compaction, and damage to soil structure and tree roots.

Windthrow and erosion are not special hazards on these soils.

Woodland Suitability Group No. 13 - Land Resource Area A3a

These are poorly to very poorly drained soils with dark gray to black sandy loam to sand surface soils and chiefly loamy sand to sand subsoil. The Myatt soils have sandy loam to clay loam subsoils. Infiltration and permeability are rapid and water-holding capacity is low. Mapping units of the following soils are included:

Myatt sandy loam
Plummer sand
Plummer loamy sand
Rutlege loamy fine sand

These soils are subject to frequent flooding and water may stand on the surface for long periods.

Loblolly pine and slash pine are preferred species where drainage is adequate but longleaf pine is also suitable. On sites receiving seepage from higher-lying soils, pond pine, blackgum, juniper, sweetgum, ash, and red maple are suitable species. Where water stands on the surface for long periods, cypress and tupelo are preferred. Hardwoods and associated conifers on these sites are of poorer quality than on alluvial Piedmont floodplains. These soils are suited to sawtimber and pulpwood rotations and to the production of poles and piling of medium lengths. Most of the hardwoods produce wilflife foods.

Average site indexes are: loblolly pine 85 $\pm$ 3; longleaf pine 72 $\pm$ 5; slash pine 85 (estimated); and pond pine 76. Approximate average annual growth per acre (board feet, Scribner) of well-stocked, unmanaged stands at 50 years of age is: loblolly pine 490, longleaf pine 250; slash pine 465; and pond pine 145.

Plant competition on these soils is considered slight or severe. Hardwoods, switch cane, briars, vines, gallberry, bay, or other vegetation compete severely with pines or intolerant hardwoods selected for management. Intensive treatments such as water management, prescribed burning, land clearing, disking, brush cutting, or applying herbicides, are necessary to control or eradicate competing vegetation. Where species preference is not important, the hazard is considered to be slight.

Expected mortality due to soil influences is classed as severe on these soils and losses may exceed 50 percent of planted seedlings. Natural regeneration of preferred species cannot be relied upon to produce adequate stands. Water management, intensive site preparation, superior planting stock and techniques, are necessary to insure well-stocked stands.

Poor drainage and seepage severely restrict the use of equipment and grazing. Water management is necessary to maintain roads and to obtain access. It also helps to prevent damage to tree roots from soil compaction. Some areas may be difficult to drain and ditches may be hard to maintain due to caving because of the coarse texture of the subsoil.

Erosion and windthrow are not special hazards of these soils.

Woodland Suitability Group No. 14 - Land Resource Area A3a

These are severely eroded, well drained soils that have sandy clay loam to clay loam textures throughout the entire profile. Infiltration and permeability are moderate to slow and water holding capacity is moderate to high. These soils occur on slopes ranging from 2 to 15 percent. Mapping units of the following soils are included:

Caroline clay loam
Magnolia sandy clay loam
Orangeburg sandy clay loam
Ruston sandy clay loam

Loblolly pine and slash pine are preferred species for sawtimber and pulpwood rotations, but longleaf pine and shortleaf pine are also suitable. These soils will produce poles and

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piling of medium and short lengths. Oaks and hickories are primary wildlife food species.

Average site indexes are: loblolly pine 75 $\pm$ 6; longleaf pine 65 (estimated); shortleaf pine 65 (estimated); and slash pine 75 (estimated). The site index potential of these soils is lower than that of the uneroded soils of the same series (woodland suitability Group 3 - A3a) due to faster surface runoff, lower infiltration rate and consequent lower available moisture supply.

Approximate average annual growth per acre (board feet, Scribner) of well-stocked, unmanaged stands at 50 years of age is: loblolly pine 365; longleaf pine 170; shortleaf pine 285; and slash pine 345.

Upland oaks, hickories, and other associated vegetation compete severely with preferred pine species. Land clearing, disking, furrowing, brush cuttings, applying herbicides, prescribed burning, or other intensive treatment, is necessary to control or eradicate competing vegetation.

Expected mortality of seedlings due to soil influences is slight on the sandy clay loams of this group and adequate stands are established naturally and by planting. On clay loams moderate mortality of 25 to 50 percent of planted stock is expected. Moisture supply on the clay loam is not as favorable as on the sandy clay loams and some site preparation is needed to obtain natural regeneration. If these clay loams are planted, some replanting to fill in large openings may be necessary.

Severe erosion and steep slopes restrict, to a moderate degree, the use of equipment on these soils. Operation of machinery or concentration of livestock should be avoided, to prevent damage to soil structure and tree roots.

The hazard of windthrow is moderate on the clay loam soils. Windfall may be expected during excessively wet seasons or during high winds because these soils do not permit adequate root development. This hazard is slight on the sandy clay loams.

These soils are severely eroded and the hazard of additional erosion is severe. Site preparation, control of competing vegetation, and other practices should be applied with as little disturbance of protective ground cover as possible, and other measures of equipment operation taken to minimize damage from additional erosion. Roads, furrows, firebreaks, or other construction should follow the contour.

Sandhills (Land Resource Area A3b)

Average site indexes by soil mapping units for soils in the Sandhills are included in Table 5. The number of site measurements used to arrive at these averages is shown, together with the calculated standard deviation, where three or more measurements were available. The woodland suitability group to which each soil was assigned for interpretation is also indicated.

Table 6 is a summary of woodland suitability groups and interpretations for soils in the Sandhills. Detailed interpretations for each of the woodland suitability groups follow.

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TABLE 5. Average Site Indexes (at 50 years) for Four Southern Pines by Soil Mapping Units in the Sandhills of South Carolina (Land Resource Area A3b) 1

SOIL MAPPING UNITS			AVERAGE SITE INDEX 5				WOODLAND SUITABILITY GROUP 6
SOIL SERIES, TYPE, AND PHASE 2	SLOPE CLASSES 3	EROSION CLASSES 4	LOBLOLLY PINE	LONGLEAF PINE	SHORTLEAF PINE	POND PINE	
Dunbar sandy loam, sandhill variant	A	1	–	73 (1)	–	–	1
Gilead loamy sand	A,B,C,D	1,2	83±8 (10)	63±3 (6)	69±0 (3)	72 (1)	1
Gilead loamy sand, thick surface	A,B,C	1	76±6 (7)	69±4 (7)	69 (1)	–	2
Hoffman loamy sand	C,D	1,2	65 (1)	56±3 (5)	–	61±3 (3)	3
Lakeland sand	B**	1	69±9 (12)	58±6 (45)	–	–	4
Lakeland sand	C	1	–	49±7 (8)	–	72 (1)	4
Lakeland sand, shallow	A,B	1	68±0 (3)	60±3 (6)	–	–	5
Lakeland sand, shallow	C	1	80 (2)	72±11 (4)	–	53 (1)	5
Lakeland sand, shallow	E	1	–	63 (1)	–	–	5
Norfolk fine sandy loam, thin solum	B	2	72 (1)	–	–	–	6
Ruston sandy loam	B	1	–	74 (1)	–	–	6
Vaucluse loamy sand	A,B	1	70 (2)	60 (2)	–	–	7
Vaucluse loamy sand	C	1,2	–	55±7 (3)	56 (1)	–	7
Vaucluse loamy sand	D	1,2	–	57±2 (6)	–	–	7
Vaucluse loamy sand	E,F	2,3	60 (1)	46±2 (4)	36 (1)	–	7
Vaucluse loamy sand, thick surface	B	1	73 (1)	60±8 (5)	–	–	7
Vaucluse loamy sand, thick surface	C,D,E	1	56 (2)	56±5 (10)	–	–	7

1 Data summarized from Appendix Table 3.

2 Where evidence supported it, certain soil types and phases within soil series were combined for this summary.

3 Slope classes:
- ** A 0 to 2% slopes, nearly level
- ** B 2 to 6% slopes, gently sloping
- C 6 to 10% slopes, sloping
- D 10 to 15% slopes, strongly sloping
- E 15 to 25% slopes, moderately steep
- F 25% and over, steep

4 Erosion classes:
1. None to slight; 75% or more of original surface soil or plow layer (in soils having thin surfaces) remaining.
2. Moderate; approximately 25% to 75% of the original A horizon or surface soil remaining.
3. Severe; more than 75% of the original plow layer or A horizon and up to 25% of the subsoil lost.
4. Moderately gullied; soils have moderately deep or deep gullies occupying 15 to 40% of the area. Area between gullies may have Class 1, 2 or 3 erosion.

5 The average site index value is followed by a plus or minus standard deviation. These were calculated wherever three or more measurements were available. The numbers in parentheses indicate the number of measurements available for each soil.

– A dash indicates that the species does not generally occur on the soil or that data are not available.

6 Numbers in this column refer to the woodland suitability group into which the soil was placed.

** Slope classes marked by a double asterisk are on well drained sands on which the A and B slopes are combined in mapping, thus forming a B slope of 0 to 6%.

TABLE 6 - WOODLAND SUITABILITY GROUPINGS OF SOILS WITH INTERPRETATIONS FOR MANAGEMENT AND TREATMENT - SANDHILLS OF SOUTH CAROLINA (LAND RESOURCE AREA A3b)

GROUP NO.	SOIL MAPPING UNIT		POTENTIAL SOIL PRODUCTIVITY - SITE INDEX AT 50 YEARS 2/				INTERPRETATIONS FOR WOODLAND CONSERVATION 3/					SUITABLE WOODCROPS
	SOIL SERIES, TYPE, AND PHASE	SLOPE AND EROSION CLASSES 1/	LOBLOLLY PINE	LONGLEAF PINE	SHORTLEAF PINE	POND PINE	PLANT COMPETITION	SEEDLING MORTALITY	EQUIPMENT LIMITATION	WINDTHROW HAZARD	EROSION HAZARD	
1	Dunbar sandy loam, sandhill variant Gilead loamy sand	A-1, B-1, B-2, C-1, C-2, D-1, D-2	83±8 (10)	64±5 (7)	69±0 (3)	72- (1)	Moderate to Severe	Slight	Slight to Moderate	Slight	Slight to Moderate	Pines
2	Gilead loamy sand, thick surface	A-1, B-1, C-1, D-1	76±6 (7)	69±4 (7)	-	69- (1)	Severe	Slight to Moderate	Slight	Slight	Slight to Moderate	Pines
3	Hoffman loamy sand	C-1, C-2, D-1	65- (1)	56±3 (9)	-	61±3 (3)	Severe	Moderate to Severe	Moderate to Severe	Severe	Severe	Pines
4	Lakeland sand	A-1, B-1, C-1	69±9 (12)	57±7 (53)	56±3 (3)	-	Severe	Slight to Moderate	Slight	Slight	Slight	Pines
5	Lakeland sand, shallow	A-1, B-1, C-1, E-1	73±6 (5)	65±10 (11)	65- *	53- (1)	Severe	Slight to Moderate	Slight to Moderate	Slight	Slight to Moderate	Pines
6	Norfolk fine sandy loam, thin solum Ruston sandy loam	B-1, B-2, D-1	72- (1)	74- (1)	-	-	Severe	Slight	Slight to Moderate	Slight	Slight to Moderate	Pines
7	Vaucluse loamy sand Vaucluse loamy sand, thick surface	B-1, C-1, C-2, D-1, D-2, E-1, E-3, F-2	63±7 (6)	55±8 (29)	51±14 (3)	-	Slight to Severe	Slight to Severe	Slight to Severe	Moderate to Severe	Moderate to Severe	Pines

1/ Slope Classes:
A = 0 to 2 percent, nearly level
B = 2 to 6 percent, gently sloping
C = 6 to 10 percent, sloping
D = 10 to 15 percent, strongly sloping
E = 15 to 25 percent, moderately steep
F = 25 percent and over, steep

Erosion Classes:
1 = none to slight (up to 25 percent of surface soil removed)
2 = moderate (25 to 75 percent of surface soil removed)
3 = severe (75 percent or more of surface soil and up to 25 percent of subsoil removed)

2/ Average site index calculated from measurements made on all mapping units included in each group. Standard deviations are shown where three or more measurements were available. Numbers in parentheses indicate the number of measurements available. A dash in place of a site index value indicates that the species is generally not suited to the soils.

3/ See text for a definition of these items.

* Site index values marked by an asterisk (*) have been supplied based on experience, judgement, and other measurements.

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Woodland Suitability Group No. 1 - Land Resource Area A3b

These are moderately well to somewhat poorly drained soils with sandy clay loam subsoils. Infiltration rate is moderate to high, permeability is moderate; water-holding capacity is moderate. Organic matter and natural fertility are low. Mapping units of the following soils are included:

Dunbar sandy loam, sandhill variant
Gilead loamy sand

The Dunbar soils occur on level to nearly level slopes whereas the Gilead soils occur on slopes ranging to 15 percent.

Loblolly pine and slash pine are preferred species but longleaf pine, shortleaf pine, and pond pine are also suitable. These soils are favorable for sawtimber and pulpwood rotations and to the production of poles and piling of medium lengths.

Average site indexes are: loblolly pine 83 $\pm$ 8; longleaf pine 64 $\pm$ 5; shortleaf pine 69 $\pm$ 0; and pond pine 72. Approximate average annual growth per acre (board feet, Scribner) of well-stocked, unmanaged stands at 50 years of age is: loblolly pine 465; longleaf pine 160; shortleaf pine 345; and pond pine 115.

The hazard of plant competition is moderate on the Dunbar soils. Blackgum, sweetgum, myrtle, gallberry, and other vegetation delay natural regeneration and restrict initial growth. Some preparation of seedbeds will help to obtain an adequate stand without delay, but special seedbed preparation is not needed. On the Gilead soils plant competition is severe and natural regeneration cannot be relied upon. Prescribed burning, land clearing, disking, furrowing, brush cutting, applying herbicides, or other intensive treatment, is necessary to control or eradicate competing vegetation, or to prepare sites prior to establishing seedlings.

Mortality of seedlings due to soil influences, when plant competition is not a factor, is considered slight and presents no special problems. Adequate stocking by natural regeneration and by planting may be expected.

The use of equipment is not restricted nor limited on the Dunbar soils. On Gilead soils a moderate restriction is recognized and frequent use of equipment during wet seasons, or concentration of livestock may damage roots. Deep ruts will form where traffic is heavy in logging roads.

Windthrow is no special hazard.

Erosion is a moderate hazard on slopes exceeding 6 percent and on the moderately eroded mapping units of this group. Construction of roads, firebreaks, furrows, or other construction, on these soils, should follow the contour where possible, and disturbance of protective ground cover should be held to a minimum.

Woodland Suitability Group No. 2 - Land Resource Area A3b

This is a moderately deep, moderately well drained soil with thick loamy sand or sand surface soil and compact sandy clay loam subsoil. It occurs on slopes up to 10 percent. Infiltration is rapid, permeability is high and water holding capacity is moderate to low. Organic matter content and natural fertility are low. Several mapping units of Gilead loamy sand, thick surface are included:

Loblolly pine, longleaf pine, and slash pine are preferred species. These soils are suited for sawtimber and pulpwood rotations and for the production of poles and piling of medium lengths. Red cedar and Arizona cypress are suited for understory plantings in windbreaks and cherry laurel is suited both for overstory or understory plantings for this purpose.

Average site indexes are: loblolly pine 76 $\pm$ 6; longleaf pine 69 $\pm$ 4; slash pine 76 (estimated); shortleaf pine 69; and pond pine 69 (estimated). Approximate average annual growth per acre (board feet, Scribner) of well-stocked, unmanaged stands at 50 years of age is: loblolly pine 375; longleaf pine 215; slash pine 360; shortleaf pine 345; and pond pine 110.

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Upland oaks, sandhill oaks, hickories, sweetgum, wiregrass, and other vegetation compete severely with preferred pine species for the limited moisture supplies. Prescribed burning, land clearing, disking, furrowing, applying herbicides, or other intensive treatment, is necessary to control or eradicate competing vegetation or to prepare sites prior to establishing seedlings.

Expected mortality of seedlings varies from slight to moderate. On slopes with favorable moisture supply or on slopes less than 6 percent, mortality of planted seedlings is less than 25 percent. Well stocked stands from natural seeding are expected. On drier sites, mortality of seedlings is expected to range from 25 to 50 percent of planted stock, and natural stands may be understocked. Light site preparation is beneficial but intensive seedbed preparation is not required.

There are no serious limitations in the use of equipment, but light, rubber-tired vehicles may have poor traction on slopes exceeding 10 percent.

Windthrow is no special hazard.

Erosion is no special problem, due to thickness of the surface soil. Where water is concentrated in furrows and roads, local movement of soil will occur and the hazard is moderate. Roads, firebreaks, and furrows should follow the contour. Soil-blowing occurs in unprotected areas. Windstrips may be necessary to protect planted pine seedlings.

On the drier sites, Nantucket pine tip moth attacks loblolly pine severely.

Woodland Suitability Group No. 3 - Land Resource Area A3b

These are shallow, well to excessively well drained soils with sand to loamy sand surfaces and thin discontinuous sandy clay subsoils underlain by clay parent materials. Infiltration is rapid and permeability is rapid to moderate. Water-holding capacity is low. Organic matter content and natural fertility are low. Several mapping units of Hoffman loamy sand are included.

Loblolly pine, longleaf pine, shortleaf pine, slash pine, pond pine, and Virginia pine are suited to these soils. Thin, ferruginous bands or horizons, and compact parent material, resulting in generally unfavorable moisture supply, limit the production potential of these soils. These soils are not suited to the production of large sawtimber. Rotations which produce small sawlogs or pulpwood are most economical. These soils will produce only short length poles and piling. Scrub oaks are primary wildlife food species but acorn production is limited by poor site potential.

Average site indexes are: loblolly pine 65; longleaf pine 56 $\pm$ 3; shortleaf pine 56 (estimated); pond pine 61 $\pm$ 3; slash pine 65 and Virginia pine 56 (not shown in table 5d but estimated for both species). Approximate average annual growth per acre (board feet, Scribner) of well-stocked, unmanaged stands at 50 years of age is: loblolly pine 235; longleaf pine 80: shortleaf pine 155; slash pine 215; pond pine 75; and Virginia pine 55 (estimated).

Wiregrass, turkey oak, bluejack oak, sandhills post oak, and other vegetation, compete severely with preferred species. Land clearing, disking, furrowing, brush cutting, applying herbicides or other intensive treatment is necessary to control or eliminate competing vegetation or to prepare sites prior to establishing seedlings.

Expected mortality of seedlings due to soil influence, after severe plant competition is controlled, exceeds 50 percent of planted seedlings except in small localized areas with seepage, where mortality ranges from 25 to 50 percent (moderate). Moisture supply is limited by shallow sola, excessive drainage, and rapid runoff. Natural regeneration cannot be relied upon. Superior or "prescription" planting is necessary to secure desired stocking on this soil.

The use of equipment is severely limited by steepness of slopes, past erosion, and clayey or ferruginous substrata. Root zones are shallow and tree roots are severely damaged by operation of equipment or concentration of livestock. As compared with other soils, a rating of moderate to severe has been given.

The hazard of windthrow is severe. Shallow rooting zones do not permit root development sufficient for stability. Salvage cuttings may be anticipated to remove trees blown over during high winds.

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Steepness of slopes and previous erosion create a severe erosion hazard. Slow permeability in the underlying material and the loose sandy surface soil material make these soils very susceptible to erosion when surface cover is removed. Firebreaks, furrows, roads, or other construction, should be avoided insofar as possible, but when necessary, should follow the contour or be accomplished so as to disturb protective ground cover as little as possible.

Damage to tree roots on these soils invites insect and disease attacks. Since the rooting zone is shallow, roots are very susceptible to damage by fire (particularly during summer), operation of equipment, and concentration of livestock. Awareness of this indirect hazard from insects and diseases is important in planning use and operations on this soil. Nantucket pine tip moth attacks loblolly pine and shortleaf pine severely on these soils.

Woodland Suitability Group No. 4 - Land Resource Area A3b

These are deep, excessively drained sands. Infiltration and permeability are rapid but water-holding capacity is low. Organic matter content and natural fertility are low. Several mapping units of Lakeland sand are included.

Loblolly, longleaf, shortleaf, and slash pine are suitable species. On dry slopes exceeding 6 percent longleaf and slash pines are the preferred species. These sites are suited for small sawtimber and pulpwood rotations and for the production of short to medium length poles and piling. Arizona cypress and red cedar are suited as understory species for windbreak plantings. Cherry laurel is suited both as overstory or understory species in windbreaks. The important commercial hardwood species are not suited to these soils. Persimmon, hickory, and oaks are primary wildlife food species but their production is limited.

Average site indexes are loblolly pine 69 $\pm$ 9; longleaf pine 57 $\pm$ 7; shortleaf pine 56 $\pm$ 3; and slash pine 69 (estimated).

Moisture supply on slopes has a strong influence on site index. Seepage or favorable moisture increases site index approximately 10 points. Slopes which have poor moisture supply and are dry have site indexes approximately 10 points lower than averages shown. Hummocky rolling topography generally produces dry sites. Smooth slopes or breaks between upland and lowland may have seepage or favorable moisture supply and are more productive. A summary of site indexes for Lakeland sand by slope classes and position on slope is included in Appendix Table 4. Approximate average annual growth per acre (board feet, Scribner) of well-stocked, unmanaged stands at 50 years of age is: loblolly pine 285; longleaf pine 90; shortleaf pine 155; and slash pine 265.

Turkey oak, bluejack oak, sandhills post oak, blackjack oak, sassafras, hickory, persimmon, wiregrass, and other vegetation compete severely with pine species. Intensive treatment such as land clearing, furrowing, disking, brush cutting, undercutting root systems, prescribed burning, or applying herbicides, is necessary to control or eradicate competing vegetation, or to prepare sites prior to establishing seedlings (Plates 12 and 13).

Seedling mortality, due to soil influences, is regarded as slight to moderate. On dry slopes where surface cover is absent, high surface temperatures and limited moisture cause moderate seeding mortality. Natural reseeding cannot be relied upon, and planting is necessary to produce stands of desired stocking. Here expected mortality of planted seedlings ranges from 25 to 50 percent. Superior or "prescription" planting techniques, including site preparation and high quality seedlings, are necessary to establish adequate stands by planting. On slopes occupying positions between lower topography and higher topography with seepage effects, the expected mortality of seedlings is slight, ranging up to 25 percent of planted seedlings. Where plant competition is controlled and sites are adequately prepared on these moist sites, natural regeneration produces well stocked stands, assuming seed supply is adequate.

The use of equipment is not generally restricted on these soils and is regarded as a slight limitation. The surface is loose and sandy and light rubber-tired vehicles have poor traction. Heavy equipment is not well supported and requires extra power to operate. These sands are abrasive and cause wear on equipment during normal operations. Even so these are not considered serious problems (Plate 14).

Windthrow is no special hazard on these soils.

Erosion is not considered an important hazard on these soils, due to the thickness of the

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Plate 12 - Pines planted following control of competing vegetation by undercutting.

Plate 13 - Pines planted in furrows constructed with fireplow to control competing vegetation.

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Plate 14 - Tractor drawn brush cutter prepares site for planting.

Photo courtesy of S.C. State Commission of Forestry.

surface soil and the rapid permeability and infiltration rate. Where water is concentrated in furrows and roads, local movement of soil will occur. For that reason furrows on slopes should follow the contour to reduce soil movement and silting damage to seedlings planted in furrows. Soil blowing may be a problem in large, open areas during spring months and protection of planted seedlings by windstrips may be necessary.

On these soils the effects on loblolly pine on Nantucket pine tip moth *(Rhyacionia frustrana)* attacks are severe. *Fomes annosus*, a root rot fungus, attacks a variety of conifers and effects are severe when it occurs on sandy soils such as this one. Also, nematodes sometimes occur on sandy soils, especially those which have been used as cropland and they can severely injure seedlings of susceptible species.

Woodland Suitability Group No. 5 - Land Resource Area A3b

These are deep, well drained sands with sandy loam or loamy sand subsoils at a depth of 30 to 40 inches. Infiltration and permeability are rapid, but water-holding capacity is low. Organic matter content is low and natural fertility is low. Several mapping units of Lakeland sand, shallow phase are included.

Loblolly and slash pines are preferred but longleaf and shortleaf pines are also suitable. These soils are suited for sawtimber and pulpwood rotations and to the production of poles and piling of medium length. Red cedar and Arizona cypress are suited for Christmas trees or for understory planting in windbreaks. Cherry laurel is suited for both overstory and understory planting in windbreaks. Persimmon, black cherry, oaks, and hickories are primary wildlife food species.

Average site indexes are: loblolly pine 73 $\pm$ 6; longleaf pine 65 $\pm$ 10; shortleaf pine 65 (estimated) and slash pine 73 (estimated). Although one stand of pond pine was measured and a site index of 53 obtained, it is not counted a desirable species on this soil. Conditions are generally more favorable on slopes greater than 6 percent if seepage or moisture supply is favorable. This soil is somewhat better for tree growth than the normal Lakeland sand in group 4 in Resource Area A3b because the higher quality subsoil material is more accessible to tree roots.

A wide variation exists in site indexes of longleaf pine. Where the subsoil is underlain by firm, compact soil material, root development and penetration is restricted and the potential of the site is lower than the average site index for these soils. Approximate average annual growth per acre (board feet, Scribner) of well-stocked, unmanaged stands at 50 years of age is: loblolly pine 340; longleaf pine 170; shortleaf pine 285; and slash pine 320.

Seedling mortality due to soil influence, where plant competition is controlled, does not appear to represent a problem on these soils.

Plant competition is expected to be severe. Blackjack oak, persimmon, sassafras, turkey oak, wiregrass, and other vegetation compete severely with preferred species. Prescribed burning, brush cutting, land clearing, disking, furrowing, applying herbicides, or other intensive treatments, are required to control or eradicate competing vegetation and to prepare sites prior to establishing seedlings.

Expected mortality of seedlings, due to soil influences, is generally slight, less than 25 percent of planted stock. Natural seeding produces well-stocked stands. However, on slopes exceeding 10 percent (slope class E) which are droughty, mortality is classed as moderate ranging from 25 to 50 percent of planted seedlings and some specialized planting techniques, including site preparation and "prescription" planting, are necessary to secure well-stocked stands. Natural stands on these steeper areas usually are understocked and require inter-planting.

There is no special limitation on the use of equipment except on slopes greater than 10 percent, where there is some difficulty in the use of certain types of equipment, due to slope and the loose surface soil. These soils are abrasive and extra power is needed to operate equipment.

Windthrow is slight on these soils.

Due to the depth of the surface soil, and its rapid infiltration rate, erosion is not a special hazard on slopes less than 10 percent. On slopes exceeding 10 percent the hazard is moderate, due to slope and loose surface soil. Where water is concentrated in furrows

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and roads, local movement of soil will occur. Construction of roads, firebreaks, and furrows should follow the contour if possible, to minimize silting damage due to erosion. Ground cover should be protected wherever possible. Soil blowing may occur in large unprotected areas and windstrips may be required to protect seedlings in exposed openings that are being regenerated.

Woodland Suitability Group No. 6 - Land Resource Area A3b

These are moderately deep to deep, well drained, sandy loam soils with sandy loam to sandy clay loam subsoils. Infiltration is rapid and permeability is moderate. Water-holding capacity is moderate to low. Organic matter content and natural fertility are low. Mapping units of the following soils are included:

Norfolk fine sandy loam, thin solum
Ruston sandy loam

Loblolly pine, slash pine, and longleaf pine are preferred species, but shortleaf pine is also suitable. These soils are suited to sawtimber and pulpwood rotations and to the production of poles and piling of medium lengths. Red cedar and Arizona cypress are suited for understory plantings in windbreaks. Cherry laurel is suited both for overstory and understory plantings in windbreaks. Oaks, hickories, mulberry, persimmon and black cherry are important wilflife food species.

Average site indexes are: loblolly pine 72; longleaf pine 74; and slash pine 72 (estimated). Approximate average annual growth per acre (board feet, Scribner) of well-stocked, unmanaged stands at 50 years of age is: loblolly pine 325; longleaf pine 275; and slash pine 310. Productivity of loblolly pine and slash pine are restricted by thin sola. Longleaf pine apparently is not as severely affected since its root system penetrates the compact subsoil sufficiently to obtain moisture.

The hazard of plant competition is severe. Upland oaks, sandhill oaks, hickory, and ground vegetation compete severely with preferred pine species. Prescribed burning, land clearing, disking, furrowing, brush cutting, applying herbicides, or other intensive treatment, are necessary to control or eradicate competing vegetation, or to prepare sites prior to establishing seedlings.

Due to the thin sola of Norfolk soils, tree roots may be damaged to a moderate extent by excessive operation of equipment or concentration of livestock. Otherwise equipment limitations are regarded as slight.

Windthrow is not a special hazard on these soils.

The hazard of erosion is moderate on the Norfolk soils due to slopes and thin sola. Firebreaks, furrows, and roads should follow the contour when feasible. Ground cover should be protected. This hazard is slight on the Ruston soils.

Woodland Suitability Group No. 7 - Land Resource Area A3b

These are well drained to excessively drained, loamy sands underlain by compacted, thin, discontinuous subsoils. Infiltration is rapid, permeability is moderate to slow and water-holding capacity is moderate to low. Organic matter content and natural fertility are low. The severely eroded phases of Vaucluse loamy sand are exceptions. They have variable soil characteristics with frequent "galled" spots and gullies. Mapping units of the following soils are included:

Vaucluse loamy sand
Vaucluse loamy sand, thick surface

The severely eroded phases frequently are not suitable for commercial production of sawtimber or pulpwood due to the low production resulting from shallow sola and restricted rooting zones. The primary objective on these soils is control of erosion, and loblolly, slash, and Virginia pines are preferred species.

The other phases of these soils have low production potentials and rotations which produce small sawlogs or pulpwood sizes are most feasible; they will produce poles and pilings of short lengths. Slash pine, loblolly pine, shortleaf pine, longleaf pine, and Virginia pine are preferred species. Sandhill oaks are wildlife food species but acorn production is poor on these soils.

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Average site indexes are: loblolly pine 63 ± 7; longleaf pine 55 ± 8; shortleaf pine 51 ± 14; slash pine 63 (estimated). Approximate average annual growth per acre (board feet, Scribner) of well stocked, unmanaged stands at 50 years of age is: loblolly pine 210; longleaf pine 75; shortleaf pine 100; and slash pine 185.

Competition from undesired vegetation is slight on severely eroded soils and on local areas with severe erosion. Here, conditions are generally too droughty for hardwood species. On the other soils in this group plant competition, mainly from turkey oak, sandhills post oak, bluejack oak, and wiregrass is severe. Brush cutting, furrowing, land clearing, disking, applying herbicides or other intensive treatment, are necessary to control or eradicate competing vegetation, or to prepare sites prior to establishing seedlings.

Seedling mortality may vary from slight to severe due to soil influences. On the gentle slopes which are not severely eroded expected mortality is slight and densely overstocked seedling stands may occur by natural means when conditions are very favorable. Less favorable moisture supply and soil conditions on severely eroded sites (erosion class 3) or where root zones are shallow, may cause severe mortality. Here, natural regeneration cannot be relied upon and a loss of more than 50 percent of planted stock may be expected. Superior planting techniques, including site preparation, mulching, and high quality planting stock, are necessary to secure adequate restocking.

Use of equipment or tools is severely limited by steep slopes, severe erosion, or by shallow rooting zones that are common to these soils. Otherwise there is only slight equipment limitation on these soils.

These soils are subject to damage from erosion because the surface soil is loose and permeability of subsoil is slow. When the soils are saturated they erode easily, particularly on the steeper slopes. Here the hazard is classed as severe on slopes exceeding 6 percent, and on slopes where past erosion has been severe. The hazard is classed as moderate where the slope is less than 6 percent and where previous erosion is slight. Construction of roads, firebreaks, furrows, or other operations which disturb the protective cover, should be carefully planned.

Trees do not develop root systems adequate for stability on the severely eroded soils or on areas where the rooting zone is shallow because of cementation or concretions in the subsoil (Plate 15). On the other soils the hazard is moderate but some windfall may be expected during high winds. Even though windfall may not occur, winds often loosen and injure root systems, and *Fomes annosus* (root rot) or insect damage on weakened trees may necessitate salvage cutting to avoid losses. Damage to roots from fire may be severe where the rooting zone is shallow.

Plate 15 - Windthrow resulting from shallow rooting on Vaucluse loamy sand.

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APPENDIX TABLE I – SOIL-SITE INDEX CORRELATION PLOT DATA FOR FIVE SOUTHERN PINES IN THE LOWER COASTAL PLAIN OF SOUTH CAROLINA (LAND RESOURCE AREA A2)

SOIL MAPPING UNIT			CLIMATIC INFORMATION			TREE MEASUREMENTS																			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES 1/	PLOT NUMBER AND COUNTY	PRECIPITATION		FROST-FREE PERIOD	LOBLOLLY PINE				LONGLEAF PINE				SHORTLEAF PINE				SLASH PINE				POND PINE			
			ANNUAL Inches	GROWING SEASON Inches	Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Bayboro loam	A-1	15-3 Colleton	48	36	259	5	33	79	98																
Bayboro loam	A-1	10-23 Charleston	49	38	279	1	63	133	123*																
Bayboro loam	A-1	128 Jasper	48	38	276	7	42	100	107																
Bayboro loam	A-1	352 Orangeburg	47	32	253	2	51	111	110																
Bayboro loam	A-1	419 Allendale	47	36	252	2	46	93	97																
Bayboro loam	A-1	293 Hampton	48	37	255													1	30	84	106				
Bladen fine sandy loam, phosphatic	A-1	P-1-C-4 Colleton	48	37	260	1	30	85	110																
Bladen fine sandy loam, phosphatic	A-1	P-1-C-7 Colleton	48	37	260	1	38	98	110																
Bladen fine sandy loam, phosphatic	A-1	P-1-C-6 Colleton	48	37	260	1	37	96	110																
Bladen fine sandy loam, phosphatic	A-1	P-1-C-9 Colleton	48	37	260	1	35	99	116																
Bladen fine sandy loam, phosphatic	A-1	P-2-C-3 Colleton	48	37	262	1	48	97	99																
Bladen fine sandy loam, phosphatic	A-1	P-3-C-8 Colleton	48	37	263	1	36	91	106																
Bladen fine sandy loam, phosphatic	A-1	P-5-C-4 Colleton	48	37	263	1	58	104	98																
Bladen fine sandy loam, phosphatic	A-1	P-6-C-9 Colleton	48	37	264	1	32	88	110																
Bladen fine sandy loam, phosphatic	A-1	10-12 Charleston	49	37	273	3	68	123	111																
Bladen fine sandy loam	A-1	120 Colleton	48	37	260	2	42	89	96																
Bladen fine sandy loam	A-1	15-7 Colleton	48	37	260	4	48	93	95																
Bladen fine sandy loam	A-1	10-34 Charleston	48	38	275	1	31	76	96																
Bladen fine sandy loam, thick surface, phosphatic	A-1	P-4-C-4 Colleton	48	37	261	1	56	101	97																
Bladen loam	A-1	36 Colleton	48	37	260	1	60	100	93																
Bladen loam	A-1	209 Horry	50	35	237	1	60	109	102																
Bladen loam	A-1	117 Colleton	48	37	264									3	46	81	85								
Bladen silty clay loam, phosphatic	A-1	P-2-C-1 Colleton	48	37	262	1	48	93	94																
Bladen silty clay loam, phosphatic	A-1	P-1-C-5 Colleton	48	37	260	1	34	92	110																
Bladen silty clay loam, phosphatic	A-1	P-1-C-4 Colleton	48	37	260	1	37	97	110																
Bladen silty clay loam, phosphatic	A-1	15-11 Colleton	48	37	265	2	54	109	108																
Bladen silty clay loam, phosphatic	A-1	P-1-C-10 Colleton	48	37	260	2	39	95	106																
Bladen silty clay loam, phosphatic	A-1	P-2-C-3 Colleton	48	37	262	1	33	104	123																
Bladen silty clay loam, phosphatic	A-1	P-3-C-11 Colleton	48	37	263	1	35	80	93																
Bladen silty clay loam, phosphatic	A-1	P-4-C-5 Colleton	48	37	261	1	35	88	103																
Bladen silty clay loam, phosphatic	A-1	272 Dorchester	49	37	260	4	37	89	103																
Bladen silty clay loam, phosphatic	A-1	15-10 Colleton	48	38	268	5	49	103	104																
Bladen silty clay loam, phosphatic	A-1	7-18 Beaufort	48	39	282	2	42	103	108																
Bladen silty clay loam, phosphatic	A-1	7-32 Beaufort	48	39	281	2	35	92	108																
Bladen silty clay loam	A-1	15-8 Colleton	48	37	260	2	44	88	94																
Bladen silty clay loam	A-1	15-9 Colleton	48	37	261	5	48	93	95																
Bladen silty clay loam	A-1	7-27 Beaufort	48	39	283	2	32	76	94																
Bladen silty clay loam	A-1	116 Colleton	48	37	264	4	61	98	92																
Bladen silty clay loam	A-1	117 Colleton	48	37	264	3	40	90	95																
Bladen silty clay loam	A-1	120 Colleton	48	37	260	1	41	82	89																
Bladen silty clay loam	A-1	132 Jasper	48	38	277	10	33	72	88																
Bladen silty clay loam	A-1	7-19 Beaufort	48	39	282	1	55	97	94																
Bladen silty clay loam	A-1	7-24 Beaufort	48	39	283	2	41	74	80																
Bladen silty clay loam	A-1	7-23 Beaufort	48	39	282	3	31	67	85																
Bladen silty clay loam	A-1	7-29 Beaufort	48	39	283	2	38	85	95																
Bladen silty clay loam	A-1	7-30 Beaufort	48	39	283	3	32	77	95																
Blanton fine sand	A-1	284 Hampton	48	36	256	2	44	72	76	4	46	66	69												
Blanton fine sand	A-1	129 Jasper	48	38	269					9	44	67	73												
Blanton fine sand	A-1	283 Hampton	48	36	256					2	38	62	73												
Blanton fine sand	B-1	210 Horry	50	35	236	4	56	71	68																
Blanton fine sand	B-1	211 Horry	50	35	236	5	48	73	75																
Blanton fine sand	B-1	638 Colleton	48	37	258									1	66	63	55								
Caroline fine sandy loam	A-1	242 Williamsburg	50	34	246	3	45	80	83																
Caroline fine sandy loam	B-1(M)	262 Dorchester	49	36	259	5	37	74	85																
Caroline fine sandy loam	B-1(M)	178 Berkeley	49	38	265					2	53	71	68	2	52	70	69								
Caroline fine sandy loam	B-1(L)	368 Marlboro	47	33	222	3	33	58	70																
Caroline fine sandy loam, thick surface	B-1(L)	178a Berkeley	49	38	265					1	48	75	76	1	50	79	79								
Caroline clay loam	B-3(M)	368 Marlboro	47	33	222	2	38	59	68																
Charleston fine sandy loam	A-1	15-4 Colleton	48	37	268									4	30	65	85					1	30	58	67
Charleston fine sandy loam	A-1	10-4 Charleston	48	38	276	5	34	66	79																
Charleston fine sandy loam	A-1	7-5 Beaufort	48	39	284	5	36	60	70																
Charleston fine sandy loam	A-1	7-6 Beaufort	48	39	285													5	43	69	73				
Charleston fine sandy loam	A-1	33 Charleston	50	37	286					2	34	55	67												

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APPENDIX TABLE I – SOIL-SITE INDEX CORRELATION PLOT DATA FOR FIVE SOUTHERN PINES IN THE LOWER COASTAL PLAIN OF SOUTH CAROLINA (LAND RESOURCE AREA A2)

SOIL MAPPING UNIT		PLOT NUMBER AND COUNTY	CLIMATIC INFORMATION			TREE MEASUREMENTS																			
			PRECIPITATION			LOBLOLLY PINE				LONGLEAF PINE				SHORTLEAF PINE				SLASH PINE				POND PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES 1/		ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Charleston fine sandy loam, phosphatic	A-1	10-10 Charleston	49	37	273	1	64	105	96																
Chewacla fine sandy loam	A-1	33-10 Marion	48	33	233	1	33	73	90																
Chewacla silt loam	A-1	16-10 Darlington	47	32	227	5	32	83	104																
Chewacla silt loam	A-1	372 Marlboro	47	33	227	5	51	91	90																
Congaree silt loam	A-1	16-1 Darlington	47	32	225	5	46	103	107																
Congaree silt loam	A-1	426 Allendale	47	34	250	2	30	93	120																
Coxville fine sandy loam	A-1	109 Clarendon	46	31	250	1	48	87	90	2	65	86	75												
Coxville fine sandy loam	A-1	176 Berkeley	49	36	262	2	56	89	85																
Coxville fine sandy loam	A-1	30 Berkeley	48	34	257	4	55	91	88																
Coxville fine sandy loam	A-1	38 Horry	50	35	238	3	36	79	91																
Coxville fine sandy loam	A-1	257 Dorchester	48	33	254	3	70	100	90																
Coxville fine sandy loam	A-1	258 Dorchester	48	34	255	4	44	83	88																
Coxville fine sandy loam	A-1	347a Orangeburg	48	33	254	3	38	84	95																
Coxville fine sandy loam	A-1	495 Sumter	46	31	258	4	33	80	96																
Coxville fine sandy loam	A-1	519 Lee	45	31	239	1	70	95	86	1	68	82	71	1	57	75	70								
Coxville fine sandy loam	A-1	199 Florence	48	32	237					6	40	58	65												
Coxville fine sandy loam	A-1	225 Williamsburg	50	36	270					5	32	57	74												
Coxville fine sandy loam	A-1	222 Williamsburg	48	33	254	3	57	99	94																
Coxville fine sandy loam	A-1	244 Williamsburg	47	33	239	5	51	93	92	2	54	86	83												
Coxville fine sandy loam	A-1	246 Williamsburg	47	33	239	3	44	82	86	3	57	69	64												
Coxville fine sandy loam	A-1	388 Darlington	46	31	232	5	40	84	92																
Coxville fine sandy loam	A-1	245 Williamsburg	47	33	240					1	58	80	74												
Coxville fine sandy loam	A-1	250 Dillon	47	33	224					6	58	78	72												
Coxville fine sandy loam	A-1	188a Berkeley	50	38	264													1	43	93	98				
Coxville loam	A-1	39b Horry	50	35	239	2	44	83	87																
Coxville loam	A-1	123b Colleton	48	35	256	2	53	91	89									3	40	91	100				
Coxville loam	A-1	95 Georgetown	50	35	239	3	50	93	93																
Coxville loam	A-1	41 Horry	50	35	234	7	41	80	87																
Coxville loam	A-1	179 Berkeley	49	38	265	3	32	70	86	10	44	70	75												
Coxville loam	A-1	197 Florence	48	32	237	5	37	80	91																
Coxville loam	A-1	198 Florence	48	32	237					6	43	61	66												
Coxville loam	A-1	9 Horry	50	35	237	3	40	79	87																
Coxville loam	A-1	200 Florence	48	32	237	1	35	72	84	2	40	69	77												
Coxville loam	A-1	434 Bamberg	48	33	251																	1	53	71	70
Coxville loam	A-1	107 Clarendon	47	32	252																	3	48	72	73
Coxville clay loam	A-1	347b Orangeburg	48	33	254	4	38	84	95																
Craven sandy loam	A-1	183 Berkeley	49	36	262	5	53	89	87																
Craven sandy loam	A-1	359 Marlboro	47	33	223	5	40	70	77																
Craven sandy loam	A-1	365 Marlboro	47	33	224					6	54	71	68												
Craven sandy loam	A-1	177 Berkeley	49	38	264									9	33	51	63								
Craven sandy loam	A-1	90s Williamsburg	50	34	262					1	56	73	69												
Craven fine sandy loam	A-1	16 Marion	48	33	226	1	62	86	80																
Craven fine sandy loam	A-1	9a Horry	50	35	237	3	43	76	81																
Craven fine sandy loam	A-1	220 Horry	50	34	235	2	58	87	83																
Craven fine sandy loam	A-1	222 Williamsburg	48	33	254	3	58	99	94																
Craven fine sandy loam	A-1	224 Williamsburg	49	34	257					8	42	63	69												
Craven fine sandy loam	A-1	247 Williamsburg	48	33	253					6	65	77	67												
Craven fine sandy loam	A-1	361 Marlboro	47	33	222					3	35	51	64												
Craven fine sandy loam	B-1(L)	95s Georgetown	50	35	239	4	53	82	80					1	53	71	69								
Dunbar sandy loam	A-1	189 Berkeley	49	38	264	2	38	83	93																
Dunbar sandy loam	A-1	68a Orangeburg	47	32	253	2	54	91	88	1	50	77	77									1	52	73	72
Dunbar fine sandy loam	A-1	30a Berkeley	48	34	257	1	65	94	86																
Dunbar fine sandy loam	A-1	221 Horry	50	34	236	5	37	82	93																
Dunbar fine sandy loam	A-1	367 Marlboro	47	33	223	4	52	88	87																
Dunbar fine sandy loam	A-1	504 Sumter	46	31	258	4	33	82	100*																
Dunbar fine sandy loam	A-1	449 Calhoun	47	31	251	4	41	80	87	3	50	79	79												
Dunbar fine sandy loam	A-1	185 Berkeley	48	34	258									1	51	60	60								
Edisto sandy loam, phosphatic	A-1	P-5-C-3 Colleton	48	37	263	1	36	83	97																
Edisto sandy loam, phosphatic	A-1	15-15 Colleton	48	37	262	2	45	90	95																
Edisto fine sandy loam, phosphatic	A-1	165a Charleston	48	38	288	7	43	96	101																
Edisto fine sandy loam, phosphatic	A-1	277 Dorchester	49	37	261	4	30	83	108																
Edisto fine sandy loam, phosphatic	A-1	113 Colleton	48	37	265	3	59	112	105																
Edisto fine sandy loam, phosphatic	A-1	33a Charleston	50	37	286	5	33	86	104																
Edisto fine sandy loam, phosphatic	A-1	7-15 Beaufort	48	39	284	3	37	101	114																

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APPENDIX TABLE I – SOIL-SITE INDEX CORRELATION PLOT DATA FOR FIVE SOUTHERN PINES IN THE LOWER COASTAL PLAIN OF SOUTH CAROLINA (LAND RESOURCE AREA A2)

SOIL MAPPING UNIT		PLOT NUMBER AND COUNTY	CLIMATIC INFORMATION			TREE MEASUREMENTS																			
			PRECIPITATION			LOBLOLLY PINE				LONGLEAF PINE				SHORTLEAF PINE				SLASH PINE				POND PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES 1/		ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Edisto fine sandy loam	A-1	93 Georgetown	50	35	252	6	52	93	92																
Edisto fine sandy loam	A-1	96 Georgetown	50	37	266	4	37	88	101																
Edisto fine sandy loam	A-1	119 Colleton	48	37	259	3	57	105	100																
Edisto fine sandy loam	A-1	20 Georgetown	50	37	267					1	46	74	77												
Edisto fine sandy loam	A-1	216 Horry	50	36	242					5	35	61	75												
Edisto fine sandy loam	A-1	10-14 Charleston	48	38	281	1	50	92	92																
Edisto fine sandy loam	A-1	10-20 Charleston	48	38	279	1	32	75	93																
Edisto fine sandy loam	A-1	10-22 Charleston	49	38	279	2	44	92	98																
Edisto fine sandy loam	A-1	18-4 Dorchester	49	37	260	2	57	101	96																
Edisto fine sandy loam	A-1	18-5 Dorchester	49	37	260	4	33	81	98																
Edisto fine sandy loam	A-1	7-7 Beaufort	48	39	283	4	31	69	88																
Edisto fine sandy loam	A-1	7-9 Beaufort	48	39	283	2	43	74	83																
Edisto fine sandy loam	A-1	131 Jasper	48	38	268																	2	41	68	72
Edisto fine sandy loam	A-1	7-21 Beaufort	48	39	284	2	39	76	85																
Edisto fine sandy loam	A-1	7-22 Beaufort	48	39	284	2	37	79	90																
Edisto fine sandy loam	A-1	7-34 Beaufort	48	39	283	2	33	72	88																
Edisto fine sandy loam	A-1	15-12 Colleton	48	37	265	5	35	79	92																
Edisto fine sandy loam	A-1	15-16 Colleton	48	38	272	3	34	75	89																
Edisto fine sandy loam	A-1	15-18 Colleton	48	38	275	2	57	94	89																
Eulonia sandy loam	A-1	91 Georgetown	50	36	258	3	53	101	99																
Eulonia sandy loam	B-1(M)	209 Horry	50	35	237	3	56	87	83																
Eulonia fine sandy loam, phosphatic	A-1	115 Colleton	48	37	265	5	45	106	110																
Eulonia fine sandy loam, phosphatic	A-1	P-1-C-2a Colleton	48	37	260	1	38	96	108																
Eulonia fine sandy loam, phosphatic	A-1	P-1-C-2b Colleton	48	37	260	1	36	100	116																
Eulonia fine sandy loam, phosphatic	A-1	P-2-C-2c Colleton	48	37	260	1	35	91	107																
Eulonia fine sandy loam, phosphatic	A-1	P-6-C-7 Colleton	48	37	263	1	34	79	94																
Eulonia fine sandy loam, phosphatic	A-1	P-6-C-8 Colleton	48	37	264	1	35	79	93																
Eulonia fine sandy loam, phosphatic	A-1	795 Dorchester	49	37	261	2	54	95	92																
Eulonia fine sandy loam, phosphatic	A-1	275a Dorchester	49	37	261					2	40	70	77												
Eulonia fine sandy loam	A-1	7-4 Beaufort	48	39	283	5	37	79	91																
Eulonia fine sandy loam	A-1	23 Georgetown	50	37	267	2	38	71	80	5	42	68	73												
Eulonia fine sandy loam	A-1	41 Horry	50	35	234	3	42	80	86																
Eulonia fine sandy loam	A-1	91 Georgetown	50	36	258	3	58	97	93																
Eulonia fine sandy loam	A-1	134 Jasper	48	38	281	12	35	91	107																
Eulonia fine sandy loam	A-1	213 Horry	50	36	239	9	50	79	79	1	57	80	75												
Eulonia fine sandy loam	A-1	215 Horry	50	36	242	8	50	80	80	2	54	88	78												
Eulonia fine sandy loam	A-1	135 Jasper	48	38	281					7	53	78	76												
Eulonia fine sandy loam	A-1	26-1 Horry	50	35	235	5	53	82	80																
Eulonia fine sandy loam	A-1	21 Georgetown	50	36	258									1	42	78	85								
Eulonia fine sandy loam	A-1	92 Georgetown	50	36	257									2	44	70	74								
Eulonia fine sandy loam	B-1(U)	21d Georgetown	50	36	258									1	46	73	77								
Eulonia fine sandy loam	B-1(U)	93 Georgetown	50	35	252	2	49	93	94*																
Eulonia fine sandy loam	B-1(U)	22 Georgetown	50	36	257									1	44	61	65								
Eulonia fine sandy loam	B-1(L)	21c Georgetown	50	36	258	1	38	76	86																
Eulonia loamy fine sand, thick surface	A-1	276 Dorchester	49	37	260	2	45	84	88					1	43	77	83								
Eulonia loamy fine sand, thick surface	A-1	275b Dorchester	49	37	261					3	40	66	72												
Eulonia loamy fine sand, thick surface	A-1	23a Georgetown	50	37	267	1	39	72	80																
Eulonia loamy fine sand, thick surface	A-1	21b Georgetown	50	36	258	2	38	69	78					2	40	74	83								
Eulonia loamy fine sand, thick surface	A-1	22 Georgetown	50	36	257									5	49	70	71								
Eulonia loamy fine sand, thick surface	A-1	156 Jasper	48	37	260	2	45	84	88																
Eulonia loamy fine sand, thick surface	A-1	7-8 Beaufort	48	39	283	1	34	60	71																
Eulonia loamy fine sand, thick surface	A-1	7-13 Beaufort	48	39	284	3	43	76	80																
Eulonia loamy fine sand, thick surface	A-1	10-7 Charleston	49	38	273	2	45	88	95*																
Eustis fine sand	B-1(M)	444 Calhoun	47	31	251	2	30	65	85																
Eustis fine sand	B-1(M)	431 Bamberg	48	33	251	5	34	70	84																
Fairhope fine sandy loam	A-1	91a Georgetown	50	36	258	1	56	94	90																
Fairhope fine sandy loam	A-1	7-3 Beaufort	48	39	287	5	33	74	90																
Fairhope fine sandy loam	A-1	18-3 Dorchester	49	37	260	4	56	88	84																
Fairhope fine sandy loam	A-1	10-2 Charleston	49	37	276									3	44	73	77								
Fairhope fine sandy loam	B-1(U)	91b Georgetown	50	36	258	3	53	79	78					2	54	70	68								
Fairhope fine sandy loam	B-1(U)	92 Georgetown	50	36	257									3	48	70	72								
Fairhope fine sandy loam	B-1(M)	22 Georgetown	50	36	257	1	56	74	71					1	55	72	69								
Flint very fine sandy loam	A-1	288 Hampton	48	38	256	1	37	76	88																
Flint very fine sandy loam	A-1	288a Hampton	48	38	256	6	39	84	93																

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APPENDIX TABLE I – SOIL-SITE INDEX CORRELATION PLOT DATA FOR FIVE SOUTHERN PINES IN THE LOWER COASTAL PLAIN OF SOUTH CAROLINA (LAND RESOURCE AREA A2)

SOIL MAPPING UNIT		PLOT NUMBER AND COUNTY	CLIMATIC INFORMATION			TREE MEASUREMENTS																			
			PRECIPITATION			LOBLOLLY PINE				LONGLEAF PINE				SHORTLEAF PINE				SLASH PINE				POND PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES 1/		ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Goldsboro sandy loam	A-1	15-2 Colleton	48	36	257					2	69	73	65												
Goldsboro sandy loam	A-1	3a Florence	47	32	234					1	40	62	70												
Goldsboro sandy loam	A-1	125 Jasper	48	37	259					7	30	58	78												
Goldsboro sandy loam	A-1	137 Jasper	48	38	263					11	50	70	70												
Goldsboro sandy loam	A-1	264 Dorchester	48	34	255					4	62	78	70												
Goldsboro sandy loam	A-1	121 Colleton	48	37	260	4	53	95	93																
Goldsboro fine sandy loam	A-1	296 Hampton	49	37	258	5	53	102	100																
Goldsboro fine sandy loam	A-1	351 Orangeburg	47	32	252	3	44	75	78	2	50	73	73												
Goldsboro fine sandy loam	A-1	447 Calhoun	46	31	250	1	35	82	96	1	37	72	85												
Goldsboro fine sandy loam	A-1	498 Sumter	46	31	258					2	44	69	74												
Goldsboro fine sandy loam	A-1	196 Florence	47	32	235	1	30	67	86																
Goldsboro fine sandy loam	A-1	271 Dorchester	49	35	257					5	49	69	70												
Goldsboro fine sandy loam	A-1	291 Hampton	48	36	255	5	55	98	95																
Goldsboro loamy sand, sandy substratum	A-1	2 Florence	47	32	234					3	40	64	72												
Hyde loam	A-1	133 Jasper	48	38	283	5	42	90	97																
Hyde clay loam, phosphatic	A-1	273 Dorchester	49	37	260	2	45	101	105																
Izagora sandy loam	A-1	18-1 Dorchester	48	34	255					4	62	66	61												
Kalmia sandy loam	A-1	15-5 Colleton	48	36	259	5	60	78	76																
Kalmia sandy loam	A-1	18-2 Dorchester	48	33	252	4	34	66	80																
Kalmia fine sandy loam	A-1	289 Hampton	48	38	256													5	35	77	90*				
Kiawah loamy fine sand	A-1	111 Colleton	48	38	267																	6	38	62	68
Kiawah loamy fine sand	A-1	118 Colleton	48	38	268																	4	32	45	52
Kiawah loamy fine sand	A-1	20b Georgetown	50	37	267					2	47	69	71												
Kiawah loamy fine sand	A-1	7 Horry	50	36	239	4	45	78	81																
Kiawah loamy fine sand	A-1	794 Dorchester	49	37	261	1	40	82	90																
Kiawah loamy fine sand	A-1	34 Charleston	50	37	286					6	62	73	66												
Kiawah loamy fine sand	A-1	164 Charleston	50	38	286					1	63	70	62												
Kiawah loamy fine sand	A-1	170 Charleston	50	38	285					8	44	55	62												
Kiawah loamy fine sand	A-1	206 Horry	50	35	237					2	58	73	68												
Kiawah loamy fine sand	A-1	166 Charleston	48	38	295	4	67	91	82																
Kiawah loamy fine sand	A-1	167 Charleston	48	38	295	4	57	79	76																
Kiawah loamy fine sand	A-1	156 Jasper	48	37	260	2	39	87	98																
Klej loamy sand	A-1	104 Clarendon	47	32	245																	1	55	61	60
Klej loamy sand	A-1	1 Florence	47	32	233	1	54	91	88																
Klej loamy sand	A-1	196a Florence	47	32	235	1	30	63	80																
Klej loamy sand	A-1	29 Berkeley	49	35	258					4	48	70	71									2	41	62	65
Klej loamy sand	A-1	37 Colleton	48	37	260					1	51	66	65												
Klej loamy sand	A-1	102 Clarendon	47	32	245					4	55	68	65												
Klej loamy sand	A-1	265 Dorchester	48	34	256					5	68	67	58												
Klej loamy sand	A-1	140 Jasper	48	37	259					3	49	61	62												
Klej loamy sand	A-1	186 Berkeley	48	34	258					4	59	66	61												
Klej loamy sand	A-1	27 Georgetown	50	38	277	2	67	77	70	1	60	68	62												
Klej loamy sand	A-1	28 Georgetown	50	38	277																	2	30	53	64
Klej loamy sand	A-1	97 Clarendon	48	33	253																	1	34	57	66
Klej loamy sand	A-1	3a Florence	47	32	234																	1	42	60	64
Klej loamy fine sand	A-1	106 Clarendon	47	32	251	5	45	79	82	2	54	76	73												
Klej loamy fine sand	A-1	236 Williamsburg	47	32	245					3	43	63	68												
Klej loamy fine sand	A-1	261 Dorchester	49	36	259	1	52	75	74					2	59	71	65					1	55	77	75
Klej loamy fine sand	A-1	283 Hampton	48	36	256					3	36	60	72												
Klej loamy fine sand	A-1	292 Hampton	48	36	255					2	55	70	66												
Klej loamy fine sand	A-1	295 Hampton	49	37	258					5	54	74	72												
Klej loamy fine sand	A-1	266 Dorchester	48	34	256					5	61	73	66												
Klej loamy fine sand	A-1	217 Horry	50	35	236					6	62	69	63												
Klej loamy fine sand	A-1	218 Horry	50	35	236					3	70	71	60												
Klej loamy fine sand	A-1	18 Florence	47	32	230					1	51	66	65												
Klej loamy fine sand	A-1	259 Dorchester	48	34	257					6	65	75	66												
Klej sand, shallow	A-1	274 Dorchester	49	36	259	1	62	77	71																
Klej sand, shallow	A-1	641 Georgetown	50	35	247	1	60	73	68	1	65	78	69												
Klej sand, shallow	A-1	642 Berkeley	51	38	269	1	30	63	80																
Klej sand, shallow	A-1	644 Berkeley	51	38	268					3	37	56	66												
Klej sand, shallow	A-1	632 Georgetown	50	36	256	1	50	64	64																
Klej sand, shallow	A-1	130 Jasper	48	38	268					7	43	70	76												
Klej sand, shallow	A-1	140 Jasper	48	37	259					7	51	60	59												
Klej sand, shallow	A-1	196 Florence	47	32	235	1	30	63	80																

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APPENDIX TABLE I – SOIL-SITE INDEX CORRELATION PLOT DATA FOR FIVE SOUTHERN PINES IN THE LOWER COASTAL PLAIN OF SOUTH CAROLINA (LAND RESOURCE AREA A2)

SOIL MAPPING UNIT		PLOT NUMBER AND COUNTY	CLIMATIC INFORMATION			TREE MEASUREMENTS																			
			PRECIPITATION			LOBLOLLY PINE				LONGLEAF PINE				SHORTLEAF PINE				SLASH PINE				POND PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES 1		ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Klej sand, shallow (cont'd)	A-1	205 Horry	50	35	237	5	42	60	65																
Klej sand, shallow	A-1	204 Horry	50	35	236	1	45	69	72	1	46	64	66												
Lakeland sand	A-1	268 Dorchester	48	35	256	1	37	55	62																
Lakeland sand	A-1	417 Allendale	48	34	252	3	35	74	85																
Lakeland sand	A-1	635 Georgetown	50	36	259	3	37	61	70																
Lakeland sand	A-1	6 Horry	50	36	238	5	47	77	79																
Lakeland sand	A-1	633 Georgetown	50	36	257	1	50	67	67																
Lakeland sand	A-1	40 Horry	50	35	233	5	36	64	74	5	35	55	67												
Lakeland sand	A-1	642a Berkeley	51	38	269	2	36	56	66																
Lakeland sand	A-1	346 Orangeburg	48	32	251					6	53	73	71												
Lakeland sand	A-1	421 Allendale	48	36	253					1	43	69	75												
Lakeland sand	A-1	124 Jasper	48	37	260					6	43	56	60												
Lakeland sand	A-1	636 Colleton	48	36	258					1	38	52	61												
Lakeland sand	B-1(U)	642b Berkeley	51	38	269	1	33	60	72																
Lakeland sand	B-1(U)	643 Berkeley	51	38	268	3	39	63	70																
Lakeland sand	B-1(U)	355 Orangeburg	47	31	253					3	38	56	66	1	42	62	68								
Lakeland sand	B-1(M)	290 Hampton	48	38	255	5	37	76	90*																
Lakeland sand	C-1(U)	642c Berkeley	51	38	269	1	33	55	67																
Lakeland sand, terrace	B-1(M)	444 Calhoun	47	31	251	2	30	65	85																
Lakeland sand, terrace	B-1(M)	431a Bamberg	48	33	251	5	34	70	84																
Lakeland sand, shallow	A-1	91 Georgetown	50	36	258	1	56	94	90																
Lakeland sand, shallow	A-1	126 Jasper	48	38	269	4	50	94	94																
Lakeland sand, shallow	A-1	506 Sumter	46	31	258	4	31	71	90																
Lakeland sand, shallow	A-1	286 Hampton	48	35	254					2	47	73	75												
Lakeland sand, shallow	A-1	292 Hampton	48	36	255					4	47	66	68												
Lakeland sand, shallow	B-1(M)	420 Allendale	47	36	252					3	60	75	68												
Lakeland sand, shallow	C-1(M)	422 Allendale	48	36	253	3	45	86	90																
Lakeland sand, shallow	C-1(M)	423 Allendale	47	36	253													2	53	84	82				
Lakeland loamy sand, shallow, terrace	A-1	848 Orangeburg	47	32	252					1	45	77	82												
Leaf very fine sandy loam	A-1	228a Williamsburg	50	36	270	2	47	89	91																
Leaf silt loam	A-1	228b Williamsburg	50	36	270	3	48	91	92																
Lenoir fine sandy loam	A-1	182 Berkeley	50	37	265	6	48	85	87					5	46	74	77								
Leon fine sand	A-1	10-3 Charleston	49	38	276					5	48	61	64												
Leon fine sand	A-1	7-1 Beaufort	48	39	288					5	46	50	52												
Leon fine sand	A-1	15-1 Colleton	48	36	258	2	43	67	71	1	36	53	60									2	58	62	60
Lynchburg sandy loam	A-1	39a Calhoun	46	31	250	3	54	87	85																
Lynchburg sandy loam	A-1	349 Orangeburg	48	32	253	6	54	90	87																
Lynchburg sandy loam	A-1	529 Lee	45	31	238	3	68	95	87																
Lynchburg sandy loam	A-1	1 Florence	47	32	233					1	57	78	73												
Lynchburg sandy loam	A-1	2 Florence	47	32	234					1	40	64	72									1	36	62	70
Lynchburg sandy loam	A-1	256 Dorchester	48	33	253					5	49	64	65												
Lynchburg sandy loam	A-1	350 Orangeburg	47	32	251					1	49	68	69												
Lynchburg fine sandy loam	A-1	30b Berkeley	48	34	257	1	65	89	81	1	58	70	65												
Lynchburg fine sandy loam	A-1	40a Calhoun	46	31	250	2	39	71	80	2	45	74	78												
Lynchburg fine sandy loam	A-1	194 Florence	47	32	235	2	33	74	89	5	34	59	73												
Lynchburg fine sandy loam	A-1	282 Hampton	48	36	256	1	45	74	77	3	38	63	73					3	38	78	87				
Lynchburg fine sandy loam	A-1	440 Calhoun	47	31	251	2	58	86	82	1	52	72	70												
Lynchburg fine sandy loam	A-1	29a Berkeley	49	35	258					2	50	67	67									1	42	58	61
Lynchburg fine sandy loam	A-1	186 Berkeley	48	34	258					1	63	71	64												
Lynchburg fine sandy loam	A-1	190 Florence	46	31	235					3	57	62	58									1	56	67	65
Lynchburg fine sandy loam	A-1	193 Florence	47	32	235					9	41	63	69									1	36	62	70
Lynchburg fine sandy loam	A-1	240 Williamsburg	50	34	238					1	44	70	75												
Lynchburg fine sandy loam	A-1	241 Williamsburg	50	34	238					7	46	69	72												
Lynchburg fine sandy loam	A-1	496 Sumter	46	31	258					2	41	65	72												
Lynchburg fine sandy loam	A-1	497 Sumter	46	31	258					2	46	65	68												
Lynchburg fine sandy loam	A-1	498 Sumter	46	31	258					1	50	65	65												
Lynchburg fine sandy loam	A-1	530 Lee	45	31	237					5	52	71	69												
Marlboro fine sandy loam	A-1	184 Berkeley	48	34	258									2	56	66	62								
Meggett fine sandy loam and loam	A-1	10-19 Charleston	48	38	279	1	44	101	107																
Meggett fine sandy loam and loam	A-1	10-8 Charleston	49	38	274	4	46	108	112																
Meggett fine sandy loam and loam	A-1	10-5 Charleston	48	38	277	2	39	90	103																
Meggett clay loam	A-1	10-31 Charleston	48	38	274	1	38	86	98																
Meggett clay loam	A-1	10-32 Charleston	48	38	275	2	31	77	99																
Meggett clay loam	A-1	10-33 Charleston	48	38	276	2	31	71	90**																

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APPENDIX TABLE I - SOIL-SITE INDEX CORRELATION PLOT DATA FOR FIVE SOUTHERN PINES IN THE LOWER COASTAL PLAIN OF SOUTH CAROLINA (LAND RESOURCE AREA A2)

SOIL MAPPING UNIT			CLIMATIC INFORMATION			TREE MEASUREMENTS																			
			PRECIPITATION			LOBLOLLY PINE				LONGLEAF PINE				SHORTLEAF PINE				SLASH PINE				POND PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES 1/	PLOT NUMBER AND COUNTY	ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Mined area, leveled (Phosphate)	A-1	10-9 Charleston	49	37	273	3	55	124	120																
Mined area, leveled (Phosphate)	A-1	10-24 Charleston	49	38	279	1	51	109	108																
Myatt sandy loam	A-1	230a Williamsburg	47	32	245	4	58	93	86																
Myatt sandy loam	A-1	850 Orangeburg	47	32	250	1	47	96	99																
Myatt fine sandy loam	A-1	287 Hampton	48	35	254	3	38	95	107	4	40	63	71												
Myatt fine sandy loam	A-1	270 Dorchester	49	35	257																	1	33	77	90
Norfolk sandy loam	A-1	176 Berkeley	49	36	262									3	69	79	68								
Norfolk sandy loam	A-1	421 Allendale	47	36	252					1	49	69	70												
Norfolk sandy loam	B-1(U)	391 Darlington	46	31	232	5	47	81	83																
Norfolk loamy sand, thick surface	A-1	30a Berkeley	48	34	257	3	63	84	77	4	58	76	70												
Norfolk loamy sand, thick surface	A-1	176a Berkeley	49	36	262					5	66	78	69												
Norfolk loamy sand, thick surface	A-1	281 Hampton	48	36	255					2	53	68	66												
Norfolk loamy sand, thick surface	A-1	187 Berkeley	49	37	264	3	57	74	71																
Norfolk loamy sand, thick surface	A-1	91a Williamsburg	47	33	243					2	56	74	70												
Ona loamy sand	A-1	28 Georgetown	50	38	277																	2	31	52	61
Ona loamy sand	A-1	27 Georgetown	50	38	277	3	66	73	67																
Ona loamy sand	A-1	175 Charleston	50	38	285	2	65	68	62																
Ona loamy sand	A-1	219 Horry	50	35	238	1	47	80	82	1	46	62	65												
Ona loamy sand	A-1	131 Jasper	48	38	268					2	49	64	65												
Ona loamy sand	A-1	139 Jasper	48	37	259					8	41	61	67												
Ona loamy sand	A-1	206 Horry	50	35	237					2	52	67	65												
Ona loamy sand	A-1	114 Colleton	48	37	260																	1	40	69	74
Ona sand	A-1	27 Georgetown	50	38	276	3	47	65	67																
Onslow sandy loam and fine sandy loam	A-1	10-1 Dorchester	49	37	262	5	46	79	81																
Onslow sandy loam and fine sandy loam	A-1	45-1 Williamsburg	47	32	245					5	48	65	66									1	39	70	76
Onslow sandy loam and fine sandy loam	A-1	114a Colleton	48	37	260	1	50	77	77													1	44	72	75
Onslow sandy loam and fine sandy loam	A-1	240 Williamsburg	50	34	238													5	55	69	67				
Onslow sandy loam and fine sandy loam	A-1	136 Jasper	48	38	264					2	48	65	66												
Onslow sandy loam and fine sandy loam	A-1	8 Horry	50	35	238	4	45	71	74	1	44	65	70												
Portsmouth sandy loam and fine sandy loam	A-1	104 Clarendon	47	32	246																	1	51	72	71
Portsmouth sandy loam and fine sandy loam	A-1	70a Orangeburg	47	32	251	2	55	100	96																
Portsmouth sandy loam and fine sandy loam	A-1	350 Orangeburg	47	32	251																	3	36	61	67
Portsmouth sandy loam and fine sandy loam	A-1	71a Orangeburg	47	32	251																	1	32	66	76
Portsmouth sandy loam and fine sandy loam	A-1	111 Colleton	48	37	267																	1	34	70	80
Portsmouth sandy loam and fine sandy loam	A-1	114b Colleton	48	37	260																	2	43	75	78
Portsmouth sandy loam and fine sandy loam	A-1	195 Florence	48	32	236	2	31	74	93																
Portsmouth sandy loam and fine sandy loam	A-1	238 Williamsburg	49	34	245	4	43	87	94																
Portsmouth sandy loam and fine sandy loam	A-1	280 Hampton	48	36	255	5	47	95	97																
Portsmouth sandy loam and fine sandy loam	A-1	352 Orangeburg	47	32	253	1	49	104	105																
Portsmouth sandy loam and fine sandy loam	A-1	435 Bamberg	48	33	251	1	30	80	103									2	31	72	90				
Portsmouth sandy loam and fine sandy loam	A-1	495 Sumter	46	31	258	1	37	86	99																
Portsmouth sandy loam and fine sandy loam	A-1	500 Sumter	46	31	258	3	33	86	104																
Portsmouth sandy loam and fine sandy loam	A-1	122 Colleton	48	35	256	3	31	82	103									11	41	83	91				
Portsmouth sandy loam and fine sandy loam	A-1	193 Florence	47	32	235																	1	40	68	73
Portsmouth loam	A-1	69a Orangeburg	47	32	251																	1	50	70	70
Portsmouth loam	A-1	73a2 Orangeburg	47	32	251	2	57	105	100																
Portsmouth loam	A-1	14 Florence	47	32	230	1	60	119	111																
Portsmouth loam	A-1	188 Berkeley	50	38	264	4	51	97	96																
Portsmouth loam	A-1	847 Orangeburg	48	32	253	1	35	89	108																
Portsmouth loam	A-1	352 Orangeburg	47	32	253	2	52	103	102																
Portsmouth loam	A-1	97 Clarendon	48	33	253																	3	35	52	58
Plummer loamy fine sand	A-1	31 Berkeley	49	37	263	5	63	94	86													1	51	82	81
Plummer loamy fine sand	A-1	416 Allendale	48	34	252	1	43	91	97																
Plummer loamy fine sand	A-1	32a Sumter	46	31	258					1	64	71	63												
Plummer loamy fine sand	A-1	526 Lee	46	30	237					3	60	72	66												
Plummer loamy fine sand	A-1	40 Horry	50	35	233					1	35	48	59												
Plummer loamy fine sand	A-1	114c Colleton	48	37	260																	1	42	69	74
Plummer sand	A-1	852 Orangeburg	47	32	250	1	52	102	100																
Plummer sand, terrace	A-1	851 Orangeburg	47	32	250	1	37	71	80																
Rains fine sandy loam	A-1	189 Berkeley	49	38	264	5	36	84	98																
Rains fine sandy loam	A-1	416a Allendale	48	34	252	2	43	81	96									2	40	74	82				
Rains fine sandy loam	A-1	418 Allendale	48	34	252	1	67	106	96																
Rains fine sandy loam	A-1	123b Colleton	48	35	256	5	44	94	100									1	43	93	98				
Rains fine sandy loam	A-1	114d Colleton	48	37	260																	1	40	65	70

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APPENDIX TABLE I – SOIL-SITE INDEX CORRELATION PLOT DATA FOR FIVE SOUTHERN PINES IN THE LOWER COASTAL PLAIN OF SOUTH CAROLINA (LAND RESOURCE AREA A2)

SOIL MAPPING UNIT		PLOT NUMBER AND COUNTY	CLIMATIC INFORMATION			TREE MEASUREMENTS																			
			PRECIPITATION			LOBLOLLY PINE				LONGLEAF PINE				SHORTLEAF PINE				SLASH PINE				POND PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES 1/		ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Rutlege loamy sand	A-1	33b Charleston	50	37	286	2	37	87	100																
Rutlege loamy sand	A-1	147 Marion	48	33	234	6	40	86	95																
Rutlege loamy sand	A-1	227 Williamsburg	47	32	247	1	35	78	95																
Rutlege loamy sand	A-1	102 Clarendon	47	32	246					1	54	67	64									1	55	75	73
Rutlege loamy sand	A-1	104 Clarendon	47	32	246																	2	50	66	66
Rutlege loamy fine sand	A-1	240 Williamsburg	50	34	238	2	49	90	91																
Rutlege loamy fine sand	A-1	114e Colleton	48	37	260	2	50	83	83													1	41	64	68
Rutlege loamy fine sand	A-1	214 Horry	50	36	242	1	58	88	84																
Rutlege loamy fine sand	A-1	518 Lee	46	31	237	3	55	87	85																
Rutlege loamy fine sand	A-1	285 Hampton	48	35	254					1	43	71	76					5	44	83	88				
Rutlege loamy fine sand	A-1	366 Marlboro	47	33	225					1	66	79	69												
Rutlege loamy fine sand	A-1	294 Hampton	48	36	254													2	37	74	84				
Rutlege loamy fine sand	A-1	189a Berkeley	49	38	264	2	35	77	90	2	44	70	75												
Seabrook loamy fine sand	A-1	162 Charleston	48	38	289	1	40	81	89																
Seabrook loamy fine sand	A-1	169 Charleston	48	38	289	5	40	81	89																
Seabrook loamy fine sand	A-1	171 Charleston	49	38	285	6	32	66	81																
Seabrook loamy fine sand	A-1	34b Charleston	50	37	286					1	60	80	73												
Seabrook loamy fine sand	A-1	164 Charleston	48	38	287					3	63	72	65												
Seabrook loamy fine sand	A-1	170 Charleston	49	38	285					3	41	63	70												
Seabrook loamy fine sand	A-1	791 Dorchester	49	38	262	1	51	91	90																
Stono fine sandy loam, phosphatic	A-1	10-11 Charleston	49	37	272	2	30	81	105																
Stono fine sandy loam, phosphatic, thick surface	A-1	10-21 Charleston	48	38	279	1	34	89	108																
St. Johns sand	A-1	24 Georgetown	50	37	267					7	46	51	53									5	46	56	57
St. Johns sand	A-1	27 Georgetown	50	38	277					4	58	61	57												
St. Johns sand	A-1	22-1 Georgetown	50	37	265					5	51	53	52									1	52	60	59
St. Johns sand	A-1	7-2 Beaufort	48	39	288																	5	46	49	50
St. Johns loamy fine sand	A-1	175 Charleston	49	38	285	1	68	73	66																
St. Lucie sand	A-1	231 Williamsburg	48	33	248	2	41	56	62																
St. Lucie sand	A-1	22-2 Georgetown	50	37	265	1	67	63	57																
St. Lucie sand	A-1	26-2 Horry	50	35	237					1	56	40	35												
Wahee silt loam	A-1	263 Dorchester	49	35	258	5	66	100	91																
Wando sand	A-1	26 Georgetown	50	36	255	4	50	73	73																
Wando sand	A-1	32a Georgetown	50	38	278	5	47	67	69	2	52	70	68	6	45	59	63								
Wando sand	A-1	212 Horry	50	36	238	2	39	56	62	1	35	57	70												
Wando sand	A-1	90 Georgetown	50	36	262					4	42	64	70												
Wando sand	A-1	168 Charleston	48	38	295													6	63	84	77				
Wando sand	A-1	792 Dorchester	49	38	262	1	50	84	84																
Wando sand	A-1	793 Dorchester	49	38	262	3	39	72	80																
Wando sand	B-1(U)	32b Georgetown	50	38	278					1	44	66	70	3	48	66	68								
Wando sand	C-1(M)	32c Georgetown	50	38	278					3	50	70	70*	8	46	76	79*								
Wando sand, shallow	A-1	276 Dorchester	49	37	260	1	42	82	89					1	45	75	79								
Wando sand, shallow	A-1	156 Jasper	48	37	260	1	42	86	93																
Weston sandy loam	A-1	20 Georgetown	50	37	267					2	39	67	76												
Weston sandy loam	A-1	127 Jasper	48	38	277					10	46	62	65												
Weston fine sandy loam, phosphatic	A-1	112 Colleton	48	37	260	5	34	82	97																
Weston fine sandy loam, phosphatic	A-1	279 Dorchester	49	37	260	6	52	103	100																
Weston fine sandy loam, phosphatic	A-1	P-2-C-6 Colleton	48	37	263	1	37	97	110																
Weston fine sandy loam, phosphatic	A-1	P-2-C-7 Colleton	48	37	263	1	42	87	93																
Weston fine sandy loam, phosphatic	A-1	P-2-C-7A Colleton	48	37	263	1	35	96	112																
Weston fine sandy loam, phosphatic	A-1	P-4-C-7B Colleton	48	37	261	1	35	97	114																
Weston fine sandy loam, phosphatic	A-1	P-4-C-1A Colleton	48	37	259	1	42	104	111																
Weston fine sandy loam, phosphatic	A-1	P-5-C-1B Colleton	48	37	262	1	43	103	110																
Weston fine sandy loam, phosphatic	A-1	P-6-C-6 Colleton	48	37	263	1	51	88	88																
Weston fine sandy loam, phosphatic	A-1	P-5-C-5 Colleton	48	37	263	1	35	90	107																
Weston fine sandy loam, phosphatic	A-1	P-1-C-1 Colleton	48	37	258	1	33	77	94																
Weston fine sandy loam, phosphatic	A-1	P-1-C-3 Colleton	48	37	259	1	36	102	119																
Weston fine sandy loam, phosphatic	A-1	P-1-C-8 Colleton	48	37	261	1	48	104	106																
Weston fine sandy loam, phosphatic	A-1	P-3-C-9 Colleton	48	37	263	1	37	97	110																
Weston fine sandy loam, phosphatic	A-1	P-3-C-10 Colleton	48	37	263	1	34	94	110																
Weston fine sandy loam, phosphatic	A-1	P-4-C-1 Colleton	48	37	261	1	47	101	103																
Weston fine sandy loam, phosphatic	A-1	P-4-C-2 Colleton	48	37	262	1	34	99	117																
Weston fine sandy loam, phosphatic	A-1	P-4-C-3 Colleton	48	37	261	1	33	96	117																
Weston fine sandy loam, phosphatic	A-1	18-6 Dorchester	49	37	260	2	35	98	115																

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APPENDIX TABLE I – SOIL-SITE INDEX CORRELATION PLOT DATA FOR FIVE SOUTHERN PINES IN THE LOWER COASTAL PLAIN OF SOUTH CAROLINA (LAND RESOURCE AREA A2)

SOIL MAPPING UNIT		PLOT NUMBER AND COUNTY	CLIMATIC INFORMATION			TREE MEASUREMENTS																			
			PRECIPITATION			LOBLOLLY PINE				LONGLEAF PINE				SHORTLEAF PINE				SLASH PINE				POND PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES 1/		ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Weston fine sandy loam, phosphatic	A-1	18-7 Dorchester	49	37	260	3	31	93	119																
Weston fine sandy loam, phosphatic	A-1	18-8 Dorchester	49	37	260	1	66	110	100																
Weston fine sandy loam, phosphatic	A-1	10-18 Charleston	48	38	282	3	33	86	106																
Weston fine sandy loam, phosphatic	A-1	7-33 Beaufort	48	39	281	3	34	88	104																
Weston fine sandy loam, phosphatic	A-1	10-6 Charleston	49	38	273	3	36	92	106																
Weston fine sandy loam	A-1	23 Georgetown	50	37	267	4	40	72	79	3	42	65	71												
Weston fine sandy loam	A-1	173 Charleston	50	38	282	7	53	86	84																
Weston fine sandy loam	A-1	174 Charleston	50	38	280	5	61	97	90																
Weston fine sandy loam	A-1	180 Berkeley	50	37	264	5	59	95	90																
Weston fine sandy loam	A-1	214 Horry	50	36	242	5	58	88	89																
Weston fine sandy loam	A-1	142 Jasper	48	38	269					5	48	70	71												
Weston fine sandy loam	A-1	159 Jasper	48	38	271					8	51	67	66												
Weston fine sandy loam	A-1	160 Jasper	48	38	271					7	47	64	66												
Weston fine sandy loam	A-1	141 Jasper	48	38	263	9	36	78	90																
Weston fine sandy loam	A-1	26-2 Horry	50	35	237					4	34	51	64												
Weston fine sandy loam	A-1	15-17 Colleton	48	38	273	2	40	86	95																
Weston fine sandy loam	A-1	15-14 Colleton	48	37	262	2	41	85	92																
Weston fine sandy loam	A-1	15-16 Colleton	48	38	273	3	51	91	90																
Weston fine sandy loam	A-1	7-31 Beaufort	48	39	283	1	31	76	96																
Weston fine sandy loam	A-1	7-26 Beaufort	48	39	283	2	33	75	90																
Weston fine sandy loam	A-1	7-25 Beaufort	48	39	283	2	33	71	86																
Weston fine sandy loam	A-1	7-20 Beaufort	48	39	283	2	41	89	98																
Weston fine sandy loam	A-1	7-17 Beaufort	48	39	282	2	40	85	92																
Weston fine sandy loam	A-1	7-10 Beaufort	48	39	283	2	44	84	89																
Weston fine sandy loam	A-1	7-28 Beaufort	48	39	283	2	41	85	94																
Weston fine sandy loam	A-1	796 Dorchester	49	38	262	1	47	78	80																
Weston fine sandy loam	A-1	797 Dorchester	49	38	262	2	43	85	90																
Weston fine sandy loam, thick surface, phosphatic	A-1	10-16 Charleston	49	38	283	1	32	76	94																
Weston fine sandy loam, thick surface, phosphatic	A-1	18-9 Dorchester	49	38	260	5	47	112	115																

1/ Position of plot on slope is indicated in parenthesis as follows: (U) upper; (M) middle; (L) lower.

* Plot thought to be influenced by favorable moisture condition therefore data is not included in the computation of average site index.

** Laboratory analysis indicated a high salt content on this plot.

*** Believed to be a phosphatic phase although not verified.

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APPENDIX TABLE 2 — SOIL-SITE INDEX CORRELATION PLOT DATA FOR FIVE SOUTHERN PINES IN THE UPPER AND MIDDLE COASTAL PLAIN OF SOUTH CAROLINA (LAND RESOURCE AREA A3a)

SOIL MAPPING UNIT		PLOT NUMBER AND COUNTY	POSITION ON SLOPE	CLIMATIC INFORMATION			TREE MEASUREMENTS																			
				PRECIPITATION			LOBLOLLY PINE				LONGLEAF PINE				SHORTLEAF PINE				SLASH PINE				POND PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES			ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Americus loamy sand	A-1	43-1 Sumter		45	31	255	4	37	74	84					1	36	59	61								
Americus loamy sand	A-1	43-2 Sumter		45	31	255					5	41	67	74												
Americus loamy sand	A-1	508 Sumter		45	31	255					3	44	58	62												
Americus loamy sand	A-1	853 Sumter		45	31	255	1	40	80	88																
Byars clay loam	A-1	363 Marlboro		47	33	225	4	60	111	104																
Caroline sandy loam	C-1	60-48 Florence	Mid	46	31	231	2	56	97	93																
Caroline fine sandy loam	C-2	358 Orangeburg	Mid	46	31	248	2	30	71	91																
Chewacla fine sandy loam	A-1	33-7 Marion		48	33	233	4	28	67	89																
Chewacla fine sandy loam	A-1	33-10 Marion		48	33	233	4	27	68	90																
Chewacla silt loam	A-1	16-10 Darlington		47	32	227	5	32	83	104																
Chewacla silt loam	A-1	8a Richland		44	29	240	2	33	90	110	1	59	80	73												
Chewacla silt loam	A-1	372 Marlboro		47	33	227	5	51	91	90																
Congaree fine sandy loam	A-1	12a Richland		44	29	240	1	30	72	91																
Congaree silt loam	A-1	16-1 Darlington		47	31	224	5	46	103	107																
Congaree silt loam	A-1	11a Richland		44	29	240	1	30	78	100																
Congaree silt loam	A-1	426 Allendale		47	34	250	2	30	93	120																
Coxville sandy loam	A-1	191 Florence		46	31	235	5	33	69	85	3	37	67	78												
Coxville fine sandy loam	A-1	248 Dillon		47	33	224	4	57	96	92																
Coxville fine sandy loam	A-1	16 Marion		48	33	226	2	62	88	82																
Coxville fine sandy loam	A-1	17 Dillon		48	33	224	7	34	66	80	4	49	62	63									1	42	63	67
Coxville fine sandy loam	A-1	192 Florence		47	31	230	1	34	64	77	2	47	61	63												
Coxville loam	A-1	5 Florence		47	32	232	1	49	90	91																
Coxville loam	A-1	243 Williamsburg		47	32	241					5	36	61	74												
Coxville loam	A-1	153 Marion		48	33	225	2	70	101	90																
Coxville silt loam	A-1	183 Berkeley		49	36	262	1	50	91	91																
Coxville silt loam	A-1	248 Dillon		47	33	224	1	57	92	88																
Coxville silt loam	A-1	154 Marion		48	33	225	1	32	65	80																
Coxville silt loam	A-1	249 Dillon		48	33	224	6	35	77	91																
Coxville silt loam	A-1	360 Marlboro		47	33	224					6	57	71	66												
Dunbar sandy loam	A-1	192 Florence		47	31	230	3	38	69	78	8	44	62	66												
Dunbar sandy loam	A-1	154a Marion		48	33	225	9	31	64	81																
Dunbar sandy loam	B-1	5a Florence	Lower	47	32	232	1	51	99	98*																
Eustis sand	A-1	304 Barnwell		44	32	246	1	61	97	90*	1	63	73	65												
Eustis sand	A-1	235 Williamsburg		48	33	246					1	44	58	62												
Eustis sand	B-1	233 Williamsburg	Mid	48	33	247	2	31	58	73	3	32	53	69												
Eustis sand	B-1	304a Barnwell	Low	44	32	246	2	65	82	75																
Eustis sand	B-1	370 Marlboro	Upper	47	33	221	2	44	65	69																
Eustis sand	B-1	235 Williamsburg	Upper	48	33	246					1	53	60	58	3	45	44	46								
Eustis sand	B-1	514 Sumter	Upper	45	30	255									2	70	70	59								
Eustis sand	B-1	300 Barnwell	Upper	46	33	248	3	33	67	82																
Eustis sand	D-1	300a Barnwell	Upper	46	33	248	3	34	65	78																
Eustis sand	D-1	110 Clarendon	Mid	47	31	250	6	35	73	87																
Eustis sand, shallow	C-1	35a Calhoun	Mid	46	31	250	1	48	88	90																
Eustis sand, shallow	C-1	203 Florence	Mid	47	32	229	3	41	77	84																
Eustis sand, shallow	C-1	52a Lexington	Mid	43	28	239					2	61	68	62												
Eustis sand, shallow	C-1	57a Lexington	Mid	43	28	239	2	34	70	81																
Eustis sand, terrace	B-1	309 Barnwell	Mid	45	32	247	2	49	85	86	1	54	73	70												
Flint sandy loam	A-1	16-8 Darlington		47	31	228	5	48	84	86																
Flint very fine sandy loam	A-1	145 Marion		48	33	231	4	53	78	76																
Flint very fine sandy loam	A-1	395 Richland		43	30	244	1	44	66	70	1	54	67	64												
Flint silt loam	A-1	149 Marion		48	33	234	5	46	81	85																
Flint silt loam	A-1	15a Richland		43	30	244	2	41	80	88					1	45	69	72								
Flint clay loam	A-3	785 Richland		44	30	247	1	30	61	79																
Flint clay loam	A-3	786 Richland		44	30	247	1	38	63	71																
Flint clay loam	B-3	394 Richland	Mid	43	30	244	2	43	68	72																
Goldsboro sandy loam	A-1	100 Clarendon		47	32	248					5	35	61	75												
Goldsboro sandy loam	A-1	380 Darlington		46	30	230					5	58	69	64												
Grady fine sandy loam	A-1	27a Sumter		45	30	255	1	41	72	78	2	47	66	68	1	42	62	67								
Grady fine sandy loam	A-1	308 Barnwell		45	32	247	3	57	90	86																
Grady fine sandy loam	A-1	345 Orangeburg		48	32	252	6	59	92	87																
Grady fine sandy loam	A-1	348 Orangeburg		48	32	253	4	62	100	93																
Grady fine sandy loam	A-1	369 Marlboro		47	33	222	4	44	84	88																
Grady fine sandy loam	A-1	380a Darlington		46	30	230					1	60	81	74												
Grady fine sandy loam	A-1	416 Allendale		48	34	252	1	49	97	98																
Grady fine sandy loam	A-1	418 Allendale		48	34	252	1	63	96	89																
Grady fine sandy loam	A-1	436 Bamberg		47	32	249	3	63	107	98																

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APPENDIX TABLE 2 - SOIL-SITE INDEX CORRELATION PLOT DATA FOR FIVE SOUTHERN PINES IN THE UPPER AND MIDDLE COASTAL PLAIN OF SOUTH CAROLINA (LAND RESOURCE AREA A3a)

SOIL MAPPING UNIT				CLIMATIC INFORMATION			TREE MEASUREMENTS																			
				PRECIPITATION			LOBLOLLY PINE				LONGLEAF PINE				SHORTLEAF PINE				SLASH PINE				POND PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES	PLOT NUMBER AND COUNTY	POSITION ON SLOPE	ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Grady fine sandy loam (cont'd)	A-1	447 Calhoun		46	31	250	3	35	76	90																
Grady fine sandy loam	A-1	504 Sumter		46	31	255	3	30	76	99																
Grady fine sandy loam	A-1	507 Sumter		46	31	255	4	30	78	100																
Grady fine sandy loam	A-1	516 Sumter		45	30	256	3	30	62	79																
Grady fine sandy loam	A-1	389 Darlington		46	31	233					2	45	58	61												
Grady fine sandy loam	A-1	435 Bamberg		48	33	251													2	50	87	87				
Grady loam	A-1	447a Calhoun		46	31	250	1	36	79	91																
Grady loam	A-1	434 Bamberg		48	33	251	1	49	91	92	1	58	71	65												
Grady loam	A-1	303 Barnwell		44	32	246	5	43	94	100																
Grady loam	A-1	43a Calhoun		45	30	247	2	47	82	84																
Grady loam	A-1	107 Clarendon		47	32	252	4	39	75	83													3	48	72	73
Grady clay loam	A-1	443 Calhoun		46	31	250	5	37	87	99																
Grady clay loam	A-1	492 Richland		44	30	246	4	42	76	82																
Grady clay loam	A-1	311 Barnwell		47	33	249	3	62	95	88																
Izagora sandy loam	A-1	84 Chesterfield		46	31	220																	7	42	59	62
Kalmia fine sandy loam	A-1	146 Marion		48	33	232	6	31	72	91																
Kalmia fine sandy loam	A-1	14a Richland		43	30	244	3	36	74	86																
Klej sand	A-1	196 Florence		47	32	235	1	32	64	81																
Klej loamy fine sand	A-1	196a Florence		47	32	235	1	30	63	80																
Lakeland sand	A-1	223 Williamsburg		48	33	253	2	44	79	83																
Lakeland sand	A-1	98 Clarendon		47	32	248	10	34	69	83																
Lakeland sand	A-1	101 Clarendon		47	32	248	4	35	69	81																
Lakeland sand	A-1	255 Dillon		48	33	225					6	54	73	70												
Lakeland sand	A-1	306 Barnwell		44	31	245					2	53	66	64												
Lakeland sand	A-1	315 Barnwell		46	33	248					2	57	68	63												
Lakeland sand	A-1	337 Orangeburg		46	31	248					5	53	76	74												
Lakeland sand	A-1	502 Sumter		46	31	257					3	55	72	69												
Lakeland sand	B-1	228 Williamsburg	Upper	47	32	247	1	56	71	68																
Lakeland sand	B-1	428 Allendale	Upper	47	34	250					2	48	60	62												
Lakeland sand	B-1	254 Dillon	Upper	48	33	225					5	44	64	68												
Lakeland sand	B-1	35 Marion	Mid	48	33	225	3	30	60	76																
Lakeland sand	B-1	45a Calhoun	Mid	46	31	249	1	54	80	77																
Lakeland sand	B-1	312 Barnwell	Mid	47	33	249					5	48	69	72												
Lakeland sand	B-1	491 Richland	Mid	44	30	246	5	35	74	86																
Lakeland sand	B-1	253 Dillon	Mid	48	33	225					7	48	61	62												
Lakeland sand	B-1	528 Lee	Mid	46	30	238					4	37	58	68												
Lakeland sand	B-1	457 Kershaw	Lower	44	30	242	3	33	71	86																
Lakeland sand	B-1	227 Williamsburg	Lower	47	32	247	1	51	64	63																
Lakeland sand	B-1	437 Bamberg	Lower	47	32	249	1	30	70	90*																
Lakeland sand	B-1	306a Barnwell	Lower	44	31	245					7	54	63	61												
Lakeland sand	C-1	60-49 Florence	Mid	46	31	231	2	55	101	97*																
Lakeland sand	C-1	227 Williamsburg	Mid	47	32	247	5	46	67	69	1	47	64	66	1	49	53	54								
Lakeland sand, terrace	A-1	427 Allendale		47	34	250					2	55	78	74												
Lakeland sand, shallow	A-1	202 Florence		47	31	230	2	32	63	77	1	41	53	60												
Lakeland sand, shallow	A-1	236 Williamsburg		47	32	245	3	50	75	75					1	37	53	61								
Lakeland sand, shallow	A-1	237 Williamsburg		48	33	249	3	68	84	77	2	70	78	66												
Lakeland sand, shallow	A-1	239 Williamsburg		50	34	236	2	54	75	73	1	57	75	70												
Lakeland sand, shallow	A-1	353 Orangeburg		47	31	253	5	34	77	93*																
Lakeland sand, shallow	A-1	354 Orangeburg		47	31	253	4	34	71	86*	1	37	67	79*												
Lakeland sand, shallow	A-1	421 Allendale		48	36	253					1	47	62	64												
Lakeland sand, shallow	A-1	4 Florence		47	31	232					5	37	55	66												
Lakeland sand, shallow	A-1	33a Sumter		45	31	255					1	54	77	74												
Lakeland sand, shallow	A-1	237 Williamsburg		48	33	249					2	69	78	66												
Lakeland sand, shallow	A-1	316 Barnwell		46	33	248					2	61	65	59												
Lakeland sand, shallow	A-1	202 Florence		47	31	229					1	41	53	60												
Lakeland sand, shallow	B-1	34a Calhoun	Upper	46	31	249	2	55	61	78					1	56	73	68								
Lakeland sand, shallow	B-1	305 Barnwell	Upper	44	31	245	2	47	77	79																
Lakeland sand, shallow	B-1	356 Orangeburg	Upper	46	31	248	2	33	67	81																
Lakeland sand, shallow	B-1	105 Clarendon	Upper	47	32	252					2	64	88	79												
Lakeland sand, shallow	B-1	302 Barnwell	Upper	45	32	247					2	68	77	66												
Lakeland sand, shallow	B-1	433 Bamberg	Mid	46	32	249	2	35	75	88																
Lakeland sand, shallow	B-1	64a Orangeburg	Mid	42	32	251	2	42	74	79	2	46	64	66	1	62	85	76								
Lakeland sand, shallow	B-1	310 Barnwell	Mid	47	33	249	4	50	80	80	1	53	76	73												

APPENDIX TABLE 2 – SOIL-SITE INDEX CORRELATION PLOT DATA FOR FIVE SOUTHERN PINES IN THE UPPER AND MIDDLE COASTAL PLAIN OF SOUTH CAROLINA (LAND RESOURCE AREA A3a)

SOIL MAPPING UNIT				CLIMATIC INFORMATION			TREE MEASUREMENTS																			
				PRECIPITATION			LOBLOLLY PINE				LONGLEAF PINE				SHORTLEAF PINE				SLASH PINE				POND PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES	PLOT NUMBER AND COUNTY	POSITION ON SLOPE	ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Lakeland sand, shallow (cont'd)	B-1	202a Florence	Mid	47	31	229									1	37	63	74								
Lakeland sand, shallow	B-1	297 Barnwell	Lower	46	32	247					4	56	70	66												
Lakeland sand, shallow	C-1	428 Allendale	Mid	47	34	250					3	54	64	61												
Lakeland sand, shallow	D-1	44a Calhoun	Mid	46	31	249	2	47	71	72	2	54	76	72												
Lakeland sand, shallow	E-1	34b Calhoun	Upper	46	31	249	1	51	80	79																
Leaf sandy loam	A-1	16-3 Darlington		47	31	225	2	31	74	94																
Leaf sandy loam	A-1	16-6 Darlington		47	31	225	5	32	75	94																
Leaf sandy loam	A-1	15 Marion		48	33	228	5	40	80	90																
Leaf sandy loam	A-1	371 Marlboro		47	33	226	4	36	75	86																
Leaf very fine sandy loam	A-1	201 Florence		46	32	236	5	34	84	100																
Leaf very fine sandy loam	A-1	424 Allendale		47	35	252	3	33	86	104																
Leaf silt loam	A-1	33-3 Marion		48	33	236	5	39	82	91																
Leaf silt loam	A-1	371a Marlboro		47	33	226	4	35	83	97																
Leaf silt loam	A-1	150 Marion		48	33	234	4	45	87	90																
Leaf silt loam	A-1	10a Richland		43	30	244	2	37	72	82																
Leaf silt loam	A-1	396 Richland		43	30	244	3	35	83	97																
Leaf silt loam	A-1	456 Kershaw		44	30	242	4	44	91	97																
Leaf silt loam	A-1	515 Sumter		45	31	255	3	49	98	99																
Leaf clay loam	A-1	148 Marion		48	33	234	3	31	71	90																
Leaf clay loam	A-1	251 Dillon		47	33	223	6	35	76	89																
Local alluvial land, well drained	A-1	38-1 Orangeburg		46	31	249	3	61	96	90																
Local alluvial land, well drained	A-1	36a Calhoun		46	31	250	2	44	93	98																
Local alluvial land, well drained	A-1	341 Orangeburg		44	31	245	5	58	113	107*																
Local alluvial land, well drained	B-1	510 Sumter	Mid	45	31	255	3	36	74	85																
Local alluvial land, well drained	B-1	487 Richland	Mid	44	30	247	2	34	75	90																
Local alluvial land, well drained	B-1	317 Aiken	Lower	44	30	242					3	49	71	72	2	45	63	67								
Lynchburg sandy loam	A-1	389 Darlington		46	31	233	3	41	76	82	2	51	71	70												
Lynchburg sandy loam	A-1	40a Calhoun		46	31	250																	1	50	70	70
Lynchburg sandy loam	A-1	102 Clarendon		47	32	246					1	53	73	71												
Lynchburg sandy loam	A-1	99 Clarendon		47	32	248					3	57	73	69												
Lynchburg fine sandy loam	A-1	152b Marion		48	33	227					3	43	67	74												
Lynchburg fine sandy loam	A-1	155 Marion		48	33	226	1	49	78	79	1	34	61	75												
Lynchburg fine sandy loam	A-1	245 Williamsburg		48	33	240	2	50	76	76	1	60	75	68												
Lynchburg fine sandy loam	A-1	520 Sumter		45	31	240	2	37	68	77	3	47	68	70												
Lynchburg fine sandy loam	A-1	432a Bamberg		46	32	249					2	68	84	76												
Lynchburg fine sandy loam	A-1	501 Sumter		46	31	258					4	53	75	73												
Magnolia sandy loam	D-1	9-1 Calhoun	Upper	45	31	248	5	63	86	80					3	68	76	66								
Magnolia sandy loam	C-2	35a Calhoun	Mid	46	31	250	1	33	75	90*																
Magnolia sandy clay loam	C-3	35b Calhoun	Upper	46	31	250	1	31	66	82																
Magnolia sandy clay loam	C-3	35c Calhoun	Mid	46	31	250	1	56	86	82																
Marlboro fine sandy loam	A-1	224 Williamsburg		49	34	257					2	44	63	67												
Marlboro fine sandy loam	B-1	487 Richland	Mid	44	30	247	2	33	71	87																
Marlboro fine sandy loam	B-2	488 Richland	Mid	44	30	247	2	33	78	94																
Myatt sandy loam	A-1	84a Chesterfield		46	31	220																	5	40	69	74
Norfolk sandy loam and loamy sand	A-1	503 Sumter		46	31	258	1	42	74	80	3	45	70	74												
Norfolk sandy loam and loamy sand	A-1	525 Lee		46	30	236	5	44	81	85	3	45	79	84												
Norfolk sandy loam and loamy sand	A-1	108 Clarendon		47	32	252	5	44	78	82																
Norfolk sandy loam and loamy sand	B-1	493 Richland	Upper	44	30	245	4	35	68	81	1	37	63	75												
Norfolk sandy loam and loamy sand	B-1	301 Barnwell	Lower	45	32	247					3	57	70	65												
Norfolk sandy loam and loamy sand	B-1	305 Barnwell	Upper	44	31	245	4	45	73	76	1	50	67	67												
Norfolk sandy loam and loamy sand	B-1	433 Bamberg	Mid	46	32	249	2	35	66	78																
Norfolk sandy loam and loamy sand	B-2	16a Richland	Upper	44	30	244	3	35	67	79																
Norfolk loamy sand, thick surface	A-1	72a Orangeburg		45	31	247	2	52	86	84																
Norfolk loamy sand, thick surface	A-1	202 Florence		47	31	229	2	36	66	78																
Norfolk loamy sand, thick surface	A-1	499 Sumter		46	31	258	2	43	80	86	2	50	69	69												
Norfolk loamy sand, thick surface	B-1	459 Kershaw	Upper	44	30	242	3	33	73	88																
Norfolk loamy sand, thick surface	B-1	105 Clarendon	Upper	47	32	251					1	70	73	62												
Norfolk loamy sand, thick surface	B-1	302 Barnwell	Upper	45	32	247					1	70	78	67												
Norfolk loamy sand, thick surface	B-1	302a Barnwell	Mid	45	32	247	1	57	76	73	3	68	77	67												
Norfolk loamy sand, thick surface	B-1	301a Barnwell	Lower	45	32	247					2	56	73	69												
Norfolk loamy sand, thick surface	B-1	304 Barnwell	Lower	44	32	246	2	62	97	90																
Norfolk loamy sand, thick surface	B-1	343 Orangeburg	Lower	46	31	248	2	36	76	87													3	38	74	81
Okenee loam	A-1	47a Lexington		43	28	239																	1	42	58	62
Okenee loam	A-1	84b Chesterfield		46	31	220																				

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APPENDIX TABLE 2 - SOIL-SITE INDEX CORRELATION PLOT DATA FOR FIVE SOUTHERN PINES IN THE UPPER AND MIDDLE COASTAL PLAIN OF SOUTH CAROLINA (LAND RESOURCE AREA A3a)

SOIL MAPPING UNIT		PLOT NUMBER AND COUNTY	POSITION ON SLOPE	CLIMATIC INFORMATION			TREE MEASUREMENTS																			
				PRECIPITATION			LOBLOLLY PINE				LONGLEAF PINE				SHORTLEAF PINE				SLASH PINE				POND PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES			ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Orangeburg sandy loam	B-2	63a Orangeburg	Upper	46	31	249	1	35	68	80																
Orangeburg sandy loam	D-1	398 Sumter	Mid	45	30	253	1	47	86	88																
Orangeburg sandy loam	D-2	26a Sumter	Upper	45	31	258	2	45	87	91																
Orangeburg loamy sand	A-1	446 Calhoun		46	31	249	3	34	71	86																
Orangeburg loamy sand	B-1	441 Calhoun	Upper	46	31	249	1	30	58	74																
Orangeburg loamy sand	B-1	450 Calhoun	Lower	45	31	248	1	32	64	80	1	37	56	66	2	38	54	62								
Orangeburg sandy clay loam	B-3	63b Orangeburg	Mid	46	31	249	1	58	81	77																
Orangeburg sandy clay loam	C-3	34a Calhoun	Mid	46	31	249	1	68	82	74																
Orangeburg sandy clay loam	C-3	438 Calhoun	Mid	46	31	249	3	40	61	67																
Orangeburg loamy sand, thick surface	B-1	392 Darlington	Upper	47	31	227	1	51	67	66	2	61	71	65												
Portsmouth sandy loam & fine sandy loam	A-1	102 Clarendon		47	32	246					1	61	76	68												
Portsmouth sandy loam & fine sandy loam	A-1	194 Florence		47	32	235					1	34	57	70												
Portsmouth sandy loam & fine sandy loam	A-1	193 Florence		47	32	235					4	38	56	63												
Portsmouth sandy loam & fine sandy loam	A-1	18 Florence		47	32	230					3	55	69	66												
Portsmouth sandy loam & fine sandy loam	A-1	344 Orangeburg		46	31	249	3	59	114	107																
Portsmouth sandy loam & fine sandy loam	A-1	71a Orangeburg		47	32	251																	1	32	66	78
Portsmouth sandy loam & fine sandy loam	A-1	229 Williamsburg		47	33	250																	5	52	64	64
Portsmouth sandy loam & fine sandy loam	A-1	432b Bamberg		46	32	249	1	65	112	102	1	69	86	74												
Portsmouth sandy loam & fine sandy loam	A-1	99 Clarendon		47	32	248					1	51	65	64												
Portsmouth loam	A-1	155 Marion		48	33	226					2	38	62	72												
Portsmouth loam	A-1	41a Calhoun		46	31	250	2	51	92	91																
Portsmouth loam	A-1	69a Orangeburg		47	32	251																	2	50	71	71
Portsmouth loam	A-1	103 Clarendon		47	32	247	2	31	72	91																
Portsmouth loam	A-1	411 Lexington		43	29	239	1	47	96	99																
Rains sandy loam	A-1	5-1 Bamberg		47	32	249	1	38	73	84									4	36	75	86				
Rains sandy loam	A-1	152a Marion		48	33	227	7	53	79	84	1	58	69	64												
Rains sandy loam	A-1	155 Marion		48	33	226	4	44	76	80																
Ruston sandy loam	B-2	314 Barnwell	Upper	46	33	248	1	55	84	81	1	64	83	77												
Ruston sandy loam	C-2	459a Kershaw	Mid	44	30	242	2	33	68	83					1	33	64	80								
Ruston fine sandy loam	A-1	373 Marlboro		47	33	220	1	30	65	83																
Ruston fine sandy loam	B-1	389 Marlboro	Upper	47	33	222	2	42	78	83																
Ruston sandy clay loam	B-3	299 Barnwell	Mid	44	31	245	2	67	79	72																
Ruston sandy clay loam	B-3	299a Barnwell	Lower	44	31	245	2	65	76	73																
Ruston loamy sand, thick surface	B-1	445 Calhoun	Mid	46	31	250	2	39	64	74					2	50	57	57								
Ruston loamy sand, thick surface	C-1	42 Calhoun	Mid	44	30	246	1	39	79	89*																
Ruston loamy sand, thick surface	C-1	42a Calhoun	Lower	44	30	246	1	33	79	96*																
Rutlege loamy fine sand	A-1	106 Clarendon		47	32	252	4	42	76	81																
Rutlege loamy fine sand	A-1	234 Williamsburg		48	33	247	5	37	73	83																
Rutlege loamy fine sand	A-1	18a Florence		47	32	230					3	50	66	66												
Rutlege loamy fine sand	A-1	252 Dillon		48	33	225					5	48	76	77									1	46	75	77
Rutlege loamy fine sand	A-1	153 Marion		48	33	225	2	65	97	89																
Rutlege loamy fine sand	A-1	155 Marion		48	33	226					1	36	63	75												
Rutlege loamy fine sand	A-1	245 Williamsburg		48	33	240	3	47	83	85																
Stough sandy loam	A-1	28-1 Kershaw		44	30	243	5	44	100	106																
Stough sandy loam	A-1	143 Jasper		48	38	273					6	53	69	67												
Wahee fine sandy loam & very fine sandy loam	A-1	33-1 Marion		48	33	230					5	67	72	63												
Wahee fine sandy loam & very fine sandy loam	A-1	33-2 Marion		48	33	232	4	34	67	84																
Wahee fine sandy loam & very fine sandy loam	A-1	33-6 Marion		48	33	232	5	39	81	90																
Wahee fine sandy loam & very fine sandy loam	A-1	9a Richland		43	30	244	1	41	63	70	1	48	58	59												
Wahee fine sandy loam & very fine sandy loam	A-1	455 Kershaw		44	30	242	3	54	89	87					3	50	74	74								
Wahee fine sandy loam & very fine sandy loam	A-1	486 Richland		44	30	246	4	56	86	82																
Wahee fine sandy loam & very fine sandy loam	A-1	393 Darlington		47	31	226	2	39	72	80																
Wahee silt loam	A-1	144 Marion		48	33	229	4	41	74	80																
Wahee silt loam	A-1	362 Marlboro		47	33	225	6	36	71	82																
Wahee silt loam	A-1	371 Marlboro		47	33	226	2	36	73	85																
Wahee silt loam	A-1	490 Richland		44	30	246	3	35	80	94																
Wehadkee silt loam	A-1	16-11 Darlington		47	31	224	5	30	80	105																
Wehadkee silt loam	A-1	426 Allendale		47	34	250	3	31	91	115																
Wehadkee silt loam	A-1	482 Richland		44	30	245	5	50	103	103																
Wehadkee silt loam	A-1	522 Lee		46	31	237	2	41	89	98																
Wehadkee silt loam	A-1	34-6 Marlboro		47	33	218	4	42	82	88																
Wehadkee silt loam	A-1	34-4 Marlboro		47	33	224	4	32	79	100																
Wehadkee silt loam	A-1	34-2 Marlboro		47	33	223	5	44	86	91																

* Very favorable moisture supply, therefore, data was not included in computation of average site index.

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APPENDIX TABLE 3 - SOIL-SITE INDEX CORRELATION PLOT DATA FOR FOUR SOUTHERN PINES IN THE SANDHILLS OF SOUTH CAROLINA (LAND RESOURCE AREA A3b)

SOIL MAPPING UNIT		PLOT NUMBER AND COUNTY	POSITION ON SLOPE	CLIMATIC INFORMATION			TREE MEASUREMENTS																REMARKS
				PRECIPITATION			LOBLOLLY PINE				LONGLEAF PINE				SHORTLEAF PINE				POND PINE				
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES			ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	
Dunbar sandy loam, sandhill variant	A-1	S-11Chesterfield		46	31	227					5	53	75	73									
Gilead loamy sand	A-1	474 Kershaw		46	30	241	3	40	66	73													
Gilead loamy sand	A-1	88 Chesterfield		46	31	220	5	49	79	80	2	56	76	68	5	53	71	69					
Gilead loamy sand	A-1	86a Chesterfield		46	31	227													4	42	68	72	
Gilead loamy sand	A-1	783 Richland		43	30	243	5	39	85	94													
Gilead loamy sand	A-1	784 Richland		43	30	243	2	34	80	96													
Gilead loamy sand	B-1	458 Kershaw	Mid	44	30	242	4	35	76	90					1	39	60	69					
Gilead loamy sand	B-1	787 Lexington	Mid	43	29	242	1	44	72	76	1	53	64	62									
Gilead loamy sand	B-1	790 Richland	Lower	43	30	243	4	40	69	76					3	46	66	68					
Gilead loamy sand	B-1	84 Chesterfield	Lower	46	31	220					5	45	58	62									
Gilead loamy sand	B-1	46a Lexington	Lower	43	28	239					1	59	67	62									
Gilead loamy sand	B-1	476 Kershaw	Lower	46	30	241	2	32	68	85													
Gilead loamy sand	C-1	60-43 Richland	Lower	43	29	243	4	33	76	92*													
Gilead loamy sand	C-1	21a Richland	Lower	43	30	243	1	43	75	80													
Gilead loamy sand	C-1	86a Chesterfield	Mid	46	31	227					2	46	58	61									
Gilead loamy sand	C-1	S-7 Chesterfield	Mid	46	31	223	4	30	71	91*									1	30	75	90*	
Gilead loamy sand	C-2	19a Richland	Mid	43	30	243	2	43	75	80													
Gilead loamy sand	C-2	86b Chesterfield	Mid	46	31	227					4	51	61	60									
Gilead loamy sand	D-2	480 Kershaw	Lower	44	30	242	2	32	66	85*													
Gilead loamy sand, thick surface	A-1	S-1 Chesterfield		46	31	226	2	47	70	72	1	48	65	66					1	46	67	69	
Gilead loamy sand, thick surface	A-1	473 Kershaw		46	30	241	2	59	84	79	3	65	83	73									
Gilead loamy sand, thick surface	A-1	789 Lexington		43	29	242	2	35	87	102*													
Gilead loamy sand, thick surface	B-1	88a Chesterfield	Upper	46	31	220	4	51	68	68	2	62	67	60	3	59	64	59					
Gilead loamy sand, thick surface	B-1	404 Lexington	Mid	43	29	242					3	70	82	70									
Gilead loamy sand, thick surface	B-1	23a Richland	Mid	43	30	243	2	70	41	76	1	48	68	69									
Gilead loamy sand, thick surface	B-1	20a Richland	Lower	43	30	243	1	57	92	88*													
Gilead loamy sand, thick surface	B-1	411 Lexington	Lower	43	29	239	2	50	79	79													
Gilead loamy sand, thick surface	B-1	478 Kershaw	Lower	46	30	241	3	46	76	79													
Gilead loamy sand, thick surface	B-1	472 Kershaw		46	30	240					3	53	69	67									
Gilead loamy sand, thick surface	D-1	475 Kershaw	Mid	46	30	241					3	67	74	64									
Gilead loamy sand, thick surface	D-1	481 Kershaw	Lower	44	30	242	1	45	75	78	3	48	72	73*									
Hoffman loamy sand	C-1	S-9 Chesterfield	Mid	46	31	227					4	51	60	60					1	41	55	59	
Hoffman loamy sand	C-1	S-10Chesterfield	Mid	46	31	228					3	50	57	57					1	46	62	64	
Hoffman loamy sand	C-1	377 Marlboro	Mid	47	33	217	1	37	57	65	5	46	51	53									
Hoffman loamy sand	C-2	S-15a Chesterfield	Upper	46	31	223					5	54	57	55									
Hoffman loamy sand	C-2	403 Lexington	Mid	43	29	241	3	40	58	65	4	49	59	59									
Hoffman loamy sand	C-2	406 Lexington	Mid	43	29	241					4	49	52	52									
Hoffman loamy sand	C-2	87 Chesterfield	Mid	46	31	228					6	46	56	59									
Hoffman loamy sand	C-2	87a Chesterfield	Lower	46	31	228													1	38	55	60	
Hoffman loamy sand	D-1	85 Chesterfield	Upper	46	31	227					8	49	61	61									
Hoffman loamy sand	D-1	383 Darlington	Mid	46	31	226					2	48	56	57									
Lakeland sand	A-1	523 Lee		46	31	237	4	36	64	74													
Lakeland sand	A-1	80 Chesterfield		46	31	218	2	51	58	57	9	52	62	59									
Lakeland sand	A-1	56a Lexington		43	28	239	1	37	62	70													
Lakeland sand	A-1	61a Lexington		43	28	239	1	40	67	73													
Lakeland sand	A-1	30a Sumter		46	31	255	1	36	62	71					1	38	49	56					
Lakeland sand	A-1	338 Orangeburg		44	30	245	4	35	59	69													
Lakeland sand	A-1	461 Kershaw		45	30	241	5	45	59	61													
Lakeland sand	A-1	86a Calhoun		44	30	244					2	52	63	62									
Lakeland sand	A-1	55a Lexington		43	28	239					3	52	60	59									
Lakeland sand	A-1	58a Lexington		43	28	239					2	71	72	60									
Lakeland sand	A-1	59a Lexington		43	28	239					2	53	68	66									
Lakeland sand	A-1	61b Lexington		43	28	239					3	57	70	62									
Lakeland sand	A-1	66a Orangeburg		44	30	245					3	43	62	65									
Lakeland sand	A-1	67a Orangeburg		44	30	245					1	58	55	52									
Lakeland sand	A-1	30a Sumter		46	31	255					1	38	60	70*									
Lakeland sand	A-1	319 Aiken		44	30	242					6	54	72	68									
Lakeland sand	A-1	327 Aiken		44	31	244					2	43	61	59									
Lakeland sand	A-1	338 Orangeburg		44	30	245	4	35	59	69	6	57	63	59									
Lakeland sand	A-1	342 Orangeburg		45	31	246					6	46	57	59									
Lakeland sand	A-1	385 Darlington		46	31	228					5	44	51	57									
Lakeland sand	A-1	386 Darlington		46	31	228					5	38	42	50									
Lakeland sand	A-1	387 Darlington		46	31	232					2	49	60	61									
Lakeland sand	A-1	399 Sumter		46	31	255					2	64	69	61									
Lakeland sand	A-1	468 Kershaw		45	30	234					4	55	66	62									

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APPENDIX TABLE 3 – SOIL-SITE INDEX CORRELATION PLOT DATA FOR FOUR SOUTHERN PINES IN THE SANDHILLS OF SOUTH CAROLINA (LAND RESOURCE AREA A3b)

SOIL MAPPING UNIT				CLIMATIC INFORMATION			TREE MEASUREMENTS																
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES	PLOT NUMBER AND COUNTY	POSITION ON SLOPE	PRECIPITATION		FROST-FREE PERIOD Days	LOBLOLLY PINE				LONGLEAF PINE				SHORTLEAF PINE				POND PINE				REMARKS
				ANNUAL Inches	GROWING SEASON Inches		NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	
Lakeland sand (cont'd)	A-1	509 Sumter		46	31	255					3	55	64	61									
Lakeland sand	B-1	S-4 Marlboro	Upper	47	33	218					1	30	38	52	1	30	41	53					
Lakeland sand	B-1	524 Lee	Upper	46	30	236	1	46	70	72	2	55	67	64									
Lakeland sand	B-1	25a Richland	Upper	43	29	243	2	38	62	69													
Lakeland sand	B-1	30a Sumter	Upper	46	31	255					2	44	52	54									
Lakeland sand	B-1	49a Lexington	Upper	43	28	239					2	44	43	47									
Lakeland sand	B-1	31a Sumter	Upper	46	31	255					1	57	51	47									
Lakeland sand	B-1	325 Aiken	Upper	45	30	241					2	35	45	55									
Lakeland sand	B-1	402 Lexington	Upper	43	29	241					3	46	44	46									
Lakeland sand	B-1	410 Lexington	Upper	43	29	241					1	41	46	50									
Lakeland sand	B-1	464 Kershaw	Upper	45	30	241					3	54	66	63									
Lakeland sand	B-1	470 Kershaw	Upper	46	30	237					3	42	46	50									
Lakeland sand	B-1	471 Kershaw	Upper	46	30	237					3	71	74	63									
Lakeland sand	B-1	381 Darlington	Upper	46	30	232					6	44	49	52									
Lakeland sand	B-1	382 Darlington	Upper	46	30	232					2	34	36	45									
Lakeland sand	B-1	17a Richland	Mid	43	29	243	1	30	56	71	2	45	58	62									
Lakeland sand	B-1	45a Calhoun	Mid	46	31	249					1	65	70	62									
Lakeland sand	B-1	62a Lexington	Mid	43	28	239					3	41	48	52									
Lakeland sand	B-1	326 Aiken	Mid	44	31	244					2	31	47	63									
Lakeland sand	B-1	328 Aiken	Mid	44	31	244					2	60	64	59									
Lakeland sand	B-1	374 Marlboro	Mid	47	33	218					4	35	48	59									
Lakeland sand	B-1	375 Marlboro	Mid	47	33	218					3	35	44	55									
Lakeland sand	B-1	387 Darlington	Mid	46	30	232					2	58	62	58									
Lakeland sand	B-1	467 Kershaw	Mid	45	30	242					3	44	59	63									
Lakeland sand	B-1	494 Richland	Mid	43	30	244					1	30	52	70*									
Lakeland sand	B-1	322 Aiken	Mid	44	31	245	1	37	58	66	6	37	59	71									
Lakeland sand	B-1	524a Lee	Mid	46	30	236					2	53	70	68									
Lakeland sand	B-1	329 Aiken	Lower	43	30	243					5	36	51	61									
Lakeland sand	B-1	405 Lexington	Lower	43	30	242					3	41	54	60									
Lakeland sand	B-1	409 Lexington	Lower	43	29	240					3	43	55	59									
Lakeland sand	C-1	31a Sumter	Upper	46	31	255					1	51	44	43									
Lakeland sand	C-1	60-44 Richland	Upper	43	30	244					2	43	51	55									
Lakeland sand	C-1	402 Lexington	Upper	43	29	241					1	52	42	41									
Lakeland sand	C-1	79 Chesterfield	Upper	46	31	216					8	68	63	54									
Lakeland sand	C-1	38a Calhoun	Upper	44	30	244									1	70	68	58					
Lakeland sand	C-1	S-14a Chesterfield	Upper	46	31	230					5	48	43	44									
Lakeland sand	C-1	323 Aiken	Mid	44	30	241					3	52	48	47									
Lakeland sand	C-1	22a Richland	Mid	43	29	243					3	55	56	53									
Lakeland sand	C-1	S-6 Chesterfield	Mid	46	31	223													1	34	63	72*	
Lakeland sand	C-1	S-8 Chesterfield	Mid	46	31	228					4	55	61	59									
Lakeland sand, shallow	A-1	53a Lexington		43	28	239	1	67	75	68	2	68	71	61									
Lakeland sand, shallow	A-1	51a Lexington		43	28	239					3	59	67	62									
Lakeland sand, shallow	A-1	54a Lexington		43	28	239					3	54	63	60									
Lakeland sand, shallow	B-1	408 Lexington	Upper	43	29	239	3	33	54	68													
Lakeland sand, shallow	B-1	89a Aiken	Upper	43	30	241					2	55	58	55									
Lakeland sand, shallow	B-1	325 Aiken	Upper	45	30	241					2	31	48	63									
Lakeland sand, shallow	B-1	412 Lexington	Mid	43	28	238	1	33	56	69													
Lakeland sand, shallow	B-1	357 Orangeburg	Mid	46	31	248					2	50	58	58									
Lakeland sand, shallow	C-1	317 Aiken	Upper	44	30	242					1	48	66	67									
Lakeland sand, shallow	C-1	S-5 Chesterfield	Upper	46	31	223	1	40	75	82	1	40	75	85									
Lakeland sand, shallow	C-1	79 Chesterfield	Mid	46	31	216					2	64	68	60					1	53	54	53	
Lakeland sand, shallow	C-1	60-41 Calhoun	Mid	44	30	245	5	39	69	77													
Lakeland sand, shallow	C-1	60-40 Calhoun	Lower	44	30	246					3	66	88	77									
Lakeland sand, shallow	E-1	317 Aiken	Mid	44	30	242					2	47	62	63									
Norfolk fine sandy loam, thin solum	B-2	429 Allendale	Upper	47	34	249	5	42	67	72													
Ruston sandy loam	B-1	452 Calhoun	Upper	44	30	245					1	45	71	74									
Ruston sandy loam	D-1	341 Orangeburg	Mid	44	31	245	1	64	104	95*													
Vaucluse loamy sand	B-1	321 Aiken	Upper	44	30	242	2	54	67	65													
Vaucluse loamy sand	B-1	379 Marlboro	Upper	47	33	217					5	42	50	56									
Vaucluse loamy sand	B-1	453 Calhoun	Mid	44	30	244	2	49	74	75*	2	53	67	64									
Vaucluse loamy sand	C-1	48a Lexington	Mid	43	28	239					2	55	50	47									
Vaucluse loamy sand	C-1	65a Orangeburg	Mid	44	30	245					2	55	65	61									
Vaucluse loamy sand	C-1	60-45 Richland	Mid	43	30	244					3	50	58	58									
Vaucluse loamy sand	C-2	466 Kershaw	Lower	45	30	241									3	42	51	56					
Vaucluse loamy sand	C-2	22a Richland	Mid	43	29	243					2	48	41	42									

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APPENDIX TABLE 3 – SOIL-SITE INDEX CORRELATION PLOT DATA FOR FOUR SOUTHERN PINES IN THE SANDHILLS OF SOUTH CAROLINA (LAND RESOURCE AREA A3b)

SOIL MAPPING UNIT		PLOT NUMBER AND COUNTY	POSITION ON SLOPE	CLIMATIC INFORMATION			TREE MEASUREMENTS																REMARKS
				PRECIPITATION			LOBLOLLY PINE				LONGLEAF PINE				SHORTLEAF PINE				POND PINE				
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES			ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	
Vaucluse sandy loam	D-1	379 Marlboro	Upper	47	33	217					3	48	53	54									
Vaucluse sandy loam	D-1	60-46 Richland	Mid	43	30	244					2	52	60	59									
Vaucluse sandy loam	D-2	60-47 Calhoun	Upper	44	30	245					1	51	61	60									
Vaucluse sandy loam	D-2	S-13a Chesterfield	Upper	46	31	225					5	50	54	54									
Vaucluse sandy loam	D-2	307 Barnwell	Upper	44	32	246					1	61	63	57									
Vaucluse sandy loam	D-2	60-47 Calhoun	Mid	44	30	245					3	54	77	74*									
Vaucluse sandy loam	D-2	469 Kershaw	Mid	46	30	232	4	45	61	65													
Vaucluse sandy loam	D-2	60-42 Lexington	Mid	43	30	244					4	55	59	56									
Vaucluse sandy loam	D-2	S-12 Chesterfield	Mid	46	30	233					2	50	70	70*									
Vaucluse sandy loam	D-2	60-47a Calhoun	Lower	44	30	245					1	54	73	70*									
Vaucluse sandy loam	E-3	24a Richland	Upper	43	30	244	2	46	57	60	1	67	51	44	1	70	42	36					
Vaucluse sandy loam	E-3	318 Aiken	Upper	45	30	241					1	52	45	44									
Vaucluse sandy loam	F-2	S-3 Chesterfield	Mid	46	31	225					1	32	38	49									
Vaucluse sandy loam	F-2	S-2 Chesterfield	Lower	46	31	225					2	58	50	47									
Vaucluse loamy sand, thick surface	B-1	321 Aiken	Upper	44	30	242	2	52	74	73					2	56	66	62					
Vaucluse loamy sand, thick surface	B-1	384 Darlington	Upper	46	31	228					4	49	55	55									
Vaucluse loamy sand, thick surface	B-1	313 Barnwell	Upper	46	33	247					4	56	56	53									
Vaucluse loamy sand, thick surface	B-1	320 Aiken	Mid	44	30	242					5	34	53	67									
Vaucluse loamy sand, thick surface	B-1	376 Marlboro	Mid	47	33	218					4	53	58	56									
Vaucluse loamy sand, thick surface	B-1	453 Calhoun	Mid	44	30	244					1	53	72	70									
Vaucluse loamy sand, thick surface	C-1	323 Aiken	Mid	44	30	241					3	48	53	54									
Vaucluse loamy sand, thick surface	C-1	22a Richland	Mid	43	29	243					2	43	45	49									
Vaucluse loamy sand, thick surface	C-1	60a Lexington	Mid	43	28	239	2	44	54	57													
Vaucluse loamy sand, thick surface	C-1	460 Kershaw	Lower	45	30	241					1	70	68	58									
Vaucluse loamy sand, thick surface	D-1	383 Darlington	Upper	46	31	227					3	52	52	50									
Vaucluse loamy sand, thick surface	D-1	50a Lexington	Upper	43	28	239					2	50	53	53									
Vaucluse loamy sand, thick surface	D-1	465 Kershaw	Mid	45	30	241	3	30	61	78*													
Vaucluse loamy sand, thick surface	D-1	384a Darlington	Mid	46	31	228					5	50	59	59									
Vaucluse loamy sand, thick surface	E-1	318a Aiken	Upper	45	30	245	1	34	46	55	5	43	49	53									
Vaucluse loamy sand, thick surface	E-1	18a Richland	Mid	43	30	244					4	45	53	55									

* Very favorable moisture supply, therefore, data was not included in computation of average site index.

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APPENDIX TABLE 4 - POTENTIAL SITE INDEXES OF LAKELAND SAND IN THE SANDHILLS BY SLOPE CLASSES AND POSITION ON SLOPE FOR LONGLEAF PINE

Soil Mapping Unit		Longleaf Pine			
Soil Series, Type, and Phase	Slope and Erosion	Site Index	Standard Deviation	Coefficient of Variation (Percent)	No. of Plots
Lakeland sand	A1	60	±4	7	18
Lakeland sand	B1(All positions)	57	±7	12	27
Lakeland sand	B1(Upper)	53	±7	13	13
Lakeland sand	B1(Middle)	61	±5	8	11
Lakeland sand	B1(Lower)	60	±1	2	3
Lakeland sand	C1(Upper)	47	±6	13	5
Lakeland sand	C1(Lower)	53	±6	11	3

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Appendix Table 5. Abridged Stand and Yield Information Per Acre for Well-stocked, Unmanaged, Normally Growing, Loblolly, Shortleaf, Longleaf, and Slash Pines. (Adapted from U. S. Department of Agriculture, Miscellaneous Publication No. 50) 1/

Site Index	Age	LOBLOLLY PINE			SHORTLEAF PINE			LONGLEAF PINE			SLASH PINE		
		Total Merchantable Volume		Average Diameter at Breast Height	Total Merchantable Volume		Average Diameter at Breast Height	Total Merchantable Volume		Average Diameter at Breast Height	Total Merchantable Volume		Average Diameter at Breast Height
	Years	Cords	Bd.Ft. (Scribner)	Inches	Cords	Bd.Ft. (Scribner)	Inches	Cords	Bd.Ft. (Scribner)	Inches	Cords	Bd.Ft. (Scribner)	Inches
50	20	-	-	-	-	-	3.2	4	-	2.8	-	-	-
	30	-	-	-	23	50	4.8	11	200	4.1	-	-	-
	40	-	-	-	33	1,450	6.1	17	900	5.1	-	-	-
	50	-	-	-	43	4,400	7.3	21	2,100	5.9	-	-	-
	60	-	-	-	48	8,150	8.3	25	3,700	6.6	-	-	-
	70	-	-	-	51	11,600	9.1	28	5,400	7.2	-	-	-
	80	-	-	-	53	14,400	9.9	31	7,250	7.8	-	-	-
60	20	12	-	4.6	12	-	3.8	8	50	3.3	20	-	4.4
	30	25	1,250	6.6	32	750	5.7	19	900	4.9	32	1,050	6.1
	40	35	4,500	8.1	46	4,400	7.3	27	2,800	6.0	40	4,100	7.6
	50	41	8,550	9.4	54	10,600	8.4	34	5,900	7.0	45	7,500	8.6
	60	46	12,250	10.4	60	15,850	9.7	40	9,300	7.8	48	10,500	9.3
	70	49	15,250	11.2	65	19,700	10.6	45	12,350	8.5	-	-	-
	80	51	17,550	11.9	68	22,600	11.4	49	15,000	9.1	-	-	-
70	20	17	100	5.4	18	-	4.5	14	200	3.8	28	-	5.2
	30	31	3,500	7.8	41	2,400	6.6	28	2,000	5.5	40	3,500	7.3
	40	42	9,400	9.6	56	9,900	8.4	39	6,100	6.8	49	9,300	8.9
	50	50	15,200	10.9	66	17,850	9.8	48	11,400	7.9	55	14,250	10.0
	60	55	19,600	12.1	73	23,450	11.0	55	16,400	8.8	59	17,400	10.8
	70	59	22,550	13.0	79	27,550	12.0	62	20,400	9.6	-	-	-
	80	62	24,600	13.8	83	30,700	12.8	67	23,700	10.3	-	-	-
80	20	22	700	6.2	25	200	5.2	20	550	4.3	35	900	6.0
	30	38	6,500	8.7	48	5,200	7.5	36	3,800	6.1	48	7,300	8.3
	40	51	14,800	10.7	65	16,200	9.5	49	10,800	7.6	58	15,150	10.1
	50	60	21,700	12.2	77	24,900	11.1	61	17,600	8.8	65	20,350	11.4
	60	66	26,400	13.6	85	30,900	12.3	70	23,500	9.8	69	23,600	12.2
	70	70	29,500	14.6	92	35,200	13.3	78	28,300	10.6	-	-	-
	80	73	31,550	15.5	97	38,550	14.2	85	32,100	11.5	-	-	-
90	20	27	1,600	6.9	30	1,100	6.1	26	1,000	4.7	41	2,750	6.8
	30	46	10,700	9.6	54	11,200	8.8	43	6,500	6.7	54	12,300	9.4
	40	61	20,550	11.7	73	23,400	10.9	59	15,800	8.3	66	20,600	11.4
	50	71	28,250	13.6	87	32,400	12.6	72	24,100	9.6	73	25,900	12.9
	60	78	33,100	15.0	98	38,700	14.0	84	31,000	10.7	78	29,600	13.9
	70	82	36,600	16.2	105	43,000	15.2	94	36,200	11.6	-	-	-
	80	85	39,100	17.2	112	46,500	16.2	103	40,600	12.5	-	-	-
100	20	32	2,750	7.4	33	3,200	7.3	30	1,700	5.2	46	5,050	7.7
	30	53	14,800	10.4	60	17,700	10.4	49	10,150	7.4	59	16,850	10.5
	40	71	26,700	12.8	82	30,600	12.8	66	20,200	9.0	72	25,450	12.8
	50	84	35,050	14.7	99	40,000	14.7	82	29,550	10.5	81	31,250	14.5
	60	92	41,000	16.2	111	46,400	16.2	96	37,400	11.7	86	35,400	15.5
	70	96	44,750	17.6	121	50,900	17.5	108	43,000	12.7	-	-	-
	80	100	47,400	18.6	128	54,400	18.6	118	48,100	13.7	-	-	-

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Appendix Table 5. Abridged Stand and Yield Information Per Acre for Well-stocked, Unmanaged, Normally Growing, Loblolly, Shortleaf, Longleaf, and Slash Pines. (Adapted from U. S. Department of Agriculture, Miscellaneous Publication No. 50) 1/

Site Index	Age	LOBLOLLY PINE			SHORTLEAF PINE			LONGLEAF PINE			SLASH PINE		
		Total Merchantable Volume		Average Diameter at Breast Height	Total Merchantable Volume		Average Diameter at Breast Height	Total Merchantable Volume		Average Diameter at Breast Height	Total Merchantable Volume		Average Diameter at Breast Height
	Years	Cords	Bd.Ft. (Scribner)	Inches	Cords	Bd.Ft. (Scribner)	Inches	Cords	Bd.Ft. (Scribner)	Inches	Cords	Bd.Ft. (Scribner)	Inches
110	20	37	4,300	7.9	-	-	-	34	2,550	5.6	-	-	-
	30	62	19,200	11.2	-	-	-	54	13,000	7.9	-	-	-
	40	82	32,800	13.7	-	-	-	73	24,400	9.8	-	-	-
	50	96	42,500	15.7	-	-	-	90	34,200	11.4	-	-	-
	60	106	49,200	17.4	-	-	-	106	42,100	12.7	-	-	-
	70	112	53,100	18.8	-	-	-	119	48,600	13.8	-	-	-
	80	116	55,900	20.0	-	-	-	130	54,000	14.9	-	-	-
120	20	42	6,500	8.5	-	-	-	-	-	-	-	-	-
	30	70	24,350	11.9	-	-	-	-	-	-	-	-	-
	40	93	39,600	14.6	-	-	-	-	-	-	-	-	-
	50	110	50,100	16.8	-	-	-	-	-	-	-	-	-
	60	121	57,250	18.6	-	-	-	-	-	-	-	-	-
	70	128	62,000	20.0	-	-	-	-	-	-	-	-	-
	80	134	65,000	21.2	-	-	-	-	-	-	-	-	-

1/ Cords = rough wood from trees 4 inches diameter breast height and over (from Tables 46, 110, 142, and 78).
Board Feet = Scribner Decimal C rule, trees 8 inches diameter breast height and over (from tables 55, 56, 119, 120, 151, 152, 87, and 88).
Average Diameter = Dominant stand (from Tables 59, 91, 123, and 155).

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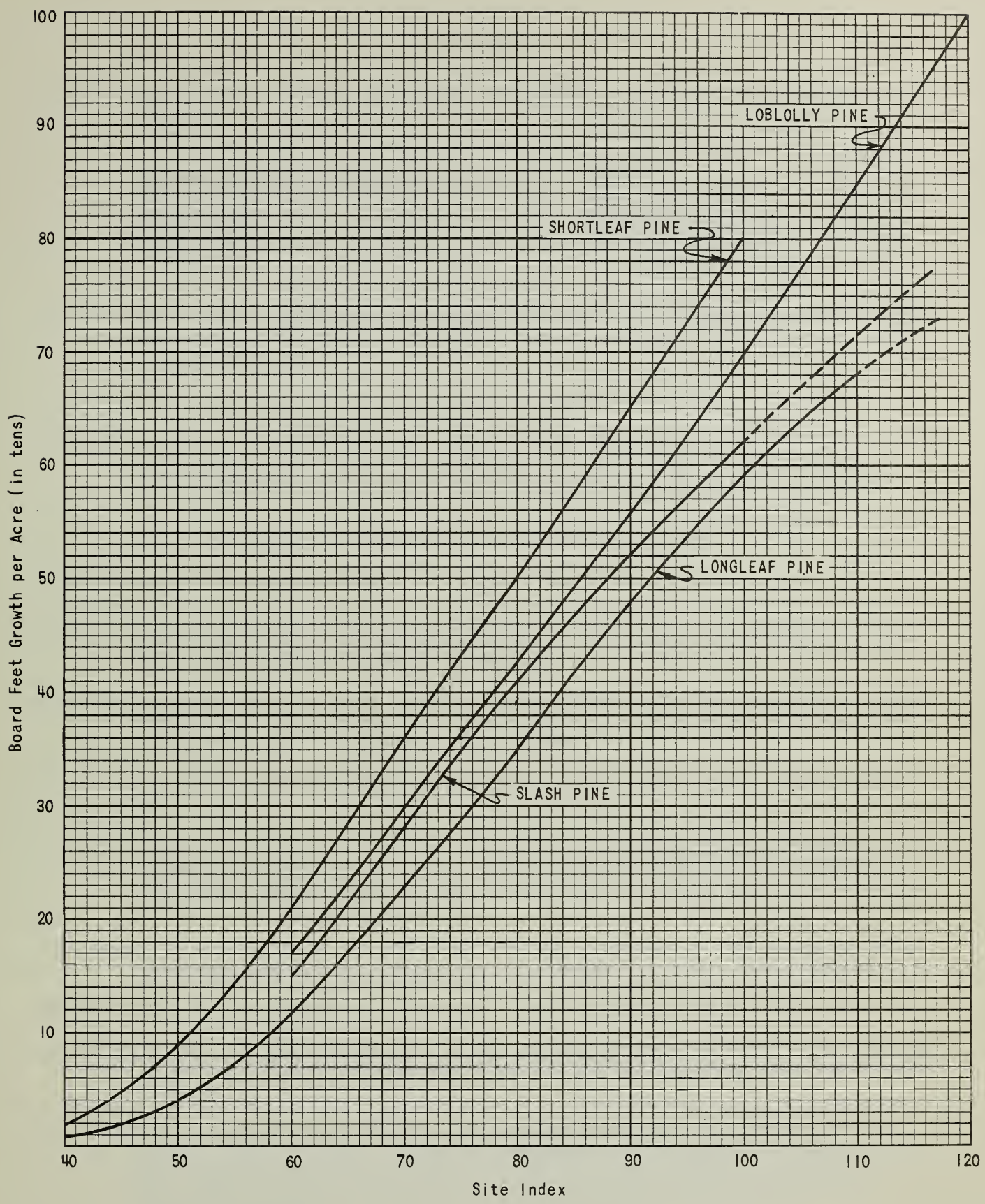

Appendix Figure I. Average Annual per Acre Growth (Board Feet, Scribner, Trees 8 Inches Diameter Breast Height and Over) of 50-Year-Old, Well-Stocked, Unmanaged Stands of Southern Pines. (Adapted from U. S. Dept. of Agriculture, Misc. Publ. No. 50.)

GLOSSARY

Acidity. The degree of acidity of the soil, expressed in pH values, or in words, as follows:

	pH		pH
Extremely acid	below 4.5	Neutral	6.6-7.3
Very strongly acid	4.5-5.0	Mildly alkaline	7.4-7.8
Strongly acid	5.1-5.5	Moderately alkaline	7.9-8.4
Medium acid	5.6-6-0	Strongly alkaline	8.5-9.0
Slightly acid	6.1-6.5	Very strongly alkaline	9.1 and higher

Alluvial soils. Soils developing from transported and fairly recently deposited material (alluvium) with little or no modification of the original materials by soil-forming processes.

Alluvium. Soil materials, as sand, silt, or clay, deposited on land by streams.

Consistence, soil. The combination of properties of soil material that determines its resistance to crushing and its ability to be molded or changed in shape. Consistence depends mainly on the forces of attraction between soil particles.

Horizon, soil. A layer of the soil, approximately parallel to the soil surface with distinct characteristics produced by soil-forming processes.

Infiltration. The entrance of water into surface horizons or sola.

Internal drainage. The movement of water through the soil profile. The rate is affected by the texture of the surface soil and subsoil and by the height of the water table, either permanent or perched.

Major land resource area. A broad geographic area with more-or-less homogeneous climate, similar soil patterns and type of agriculture, within which simple and direct correlations and interpretations can be made.

Permeability. That quality of a soil horizon that enables water or air to move through it.

Soil fertility. The quality that enables the soil to provide the proper compounds, in the proper amounts and in the proper balance, for the growth of specified plants, when other factors, such as light, temperature, moisture, and the physical condition of the soil, are favorable.

Soil phase. A subdivision of the soil type covering variations in such things as relief, stoniness, and erosion, things that are significant to use and management.

Soil profile. A vertical section of the soil from the surface into the parent material.

Soil mapping unit. A soil mapping unit is the smallest delineation shown on the soil map. It is identified by soil series, types and phases, including slope and erosion classes.

Soil series. A group of soils that have the same profile characteristics and the same general range in color, structure, consistence, and sequence of horizons; the same general conditions of relief and drainage; and, usually, a common or similar origin and mode of formation. A group of soil types similar in all respects except for the texture of the surface soil.

Soil solum (sola - plural). The genetic soil developed by soil-building forces. In normal soils, the solum includes the A and B horizons, or the upper part of the soil profile above the parent material.

Soil type. A subdivision of the soil series based on the texture of the surface soil.

Water-holding capacity. The ability of a soil to hold water. The capacity (or ability) of soil to hold water against gravity.

Woodcrop. A forest cover type. A species or combination of species of woody plants that may be harvested during the current and ensuing rotations and for which potential soil productivity information is useful.

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SOIL SURVEY INTERPRETATIONS FOR WOODLAND CONSERVATION

SOUTH CAROLINA....PROGRESS REPORT

Volume 2 **SOUTHERN PIEDMONT** **1964**

U. S. Department of Agriculture
Soil Conservation Service
Columbia, S. C.

SOIL SURVEY INTERPRETATIONS
For
WOODLAND CONSERVATION

SOUTH CAROLINA PROGRESS REPORT

SOUTHERN PIEDMONT

Volume 2

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COVER PICTURE

Well managed woodlands on a productive soil in the Southern Piedmont of South Carolina. SC-1780-7

IMPORTANCE OF WOODLAND CONSERVATION IN SOUTH CAROLINA

Two of every three acres in South Carolina are woodlands. Each year South Carolina's woodland provides the raw material for a variety of forest products industries, contributing more than a third of a billion dollars to the economy of the state annually.

Well-managed woodlands protect watersheds and help assure an adequate supply of good water. People and industries require large quantities of water. For example, the city of Columbia uses an average of about 16.5 million gallons of water each day; the city of Greenville purchased and manages approximately 9,000 acres of land to protect its water supply; Lake Murray, a hydroelectric reservoir, is capable of storing 1,613,860 acre-feet of water to generate millions of kilowatt hours of electricity; the pulp and paper mill at Georgetown uses approximately 20,000 gallons of water per minute in the paper making process.

Forest cover protects soil from erosion. Sediment from eroding land fills reservoirs, stream channels, and harbors, and increases flooding. Dredging the harbor at Charleston during 1960 cost 1.5 million dollars. Forest cover slows runoff, and enables more water to enter the soil faster. Stream flow is more even, quality of water is improved, and sediment reduced, when forest cover is present.

Forests provide recreation areas. More than 3 million vacationers, campers, swimmers, and picnickers visit our state parks annually, to find respite from the city or their labor. During 1963 fishermen, hunters, and others made 750,000 visits to the National Forests in South Carolina.

Forests furnish homes and food for wildlife. Woodlands are the natural habitat of many wild creatures. Food and cover are abundant where well-managed forests occur in association with properly treated agricultural lands. Wildlife resources are important to society in many ways, some of which can be evaluated in terms of economic returns.

Trees are products of the soil, but neither soil nor forests are indestructible or inexhaustible. If soil is misused, depleted, or eroded, its usefulness for growing trees, or providing other related benefits, is impaired. Likewise, carelessness and abuse of woodlands may result in waste and destruction of forest resources.

Woodland conservation, the intelligent care and use of forest lands, concerns everyone. It is a vital part of a soil and water conservation program. It is important that woodlands be wisely used and conserved to benefit our people.

The 1958 survey (Larson, 1960) (1) shows that the size and quality of trees being harvested in South Carolina generally are decreasing. It is pointed out that the amount and kind of timber which will be available in the future will depend largely upon the actions of private landowners because they own 77 percent of the total commercial forest land in South Carolina.

Results of the Conservation Needs Inventory, completed in 1959 by the U. S. Department of Agriculture, estimate that approximately 11½ million acres will be required for woodland production in South Carolina by 1975. At present, 2¼ million acres need timber stand establishment; over 3 million acres need timber stand improvement; approximately 4½ million acres need additional protection from fire, insects, and diseases; more than ½ million acres need protection from animals; and 100,000 acres need erosion control and establishment of shelter belts.

Increased emphasis is being placed on woodland conservation by detailed planning for watershed protection and flood prevention, by multiple-use of forest lands, and by intensive soil and water conservation practices. Soil Conservation Districts, with technical assistance from the Soil Conservation Service, S. C. State Commission of

Forestry, and other agencies or individuals, are helping landowners develop complete soil and water conservation programs which include care of woodlands. Forest industries are working effectively with small landowners and on company-owned lands to develop woodland resources.

This publication contains information and interpretations of soils and tree growth which will be useful to all individuals interested in woodland resources. There is much more we need to know.

John R. Tiller
State Forester

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INTRODUCTION

This report is an interpretation of soils for woodland conservation in the Southern Piedmont area of South Carolina. The soils are interpreted for woodland uses in terms of potential productivity and soil-related hazards and limitations. The purpose is to provide available knowledge about soils as they relate to woodland conservation.

Since 1937, the Soil Conservation Service, in cooperation with the South Carolina Agricultural Experiment Station, has made soil surveys on 10,292,000 acres in South Carolina. About 5,896,000 acres of these surveys are classed as modern standard surveys, embodying recent technological advancements. The rest are older surveys that need to be converted to modern standard surveys or re-mapped to be most useful. Long range plans include conversion of these older soil surveys into modern form and completion of surveys of the remainder of the state.

The information in this report applies specifically to the modern standard soil surveys. It is the best information available at this time; however, it is subject to change as new information becomes available. The collection of information is a product of joint efforts, judgments, experiences, and field observation, of a large number of local soil scientists and foresters.

Soil Survey Interpretations for Woodland Conservation for the Coastal Plains and Sandhills Areas of South Carolina (Major Land Resource Areas 133, 137, and 153) have been published previously, Ellerbe and Smith (15). A similar publication is being prepared for the Blue Ridge Area (Major Land Resource Area 130). These major land resources are shown in Figure 1.

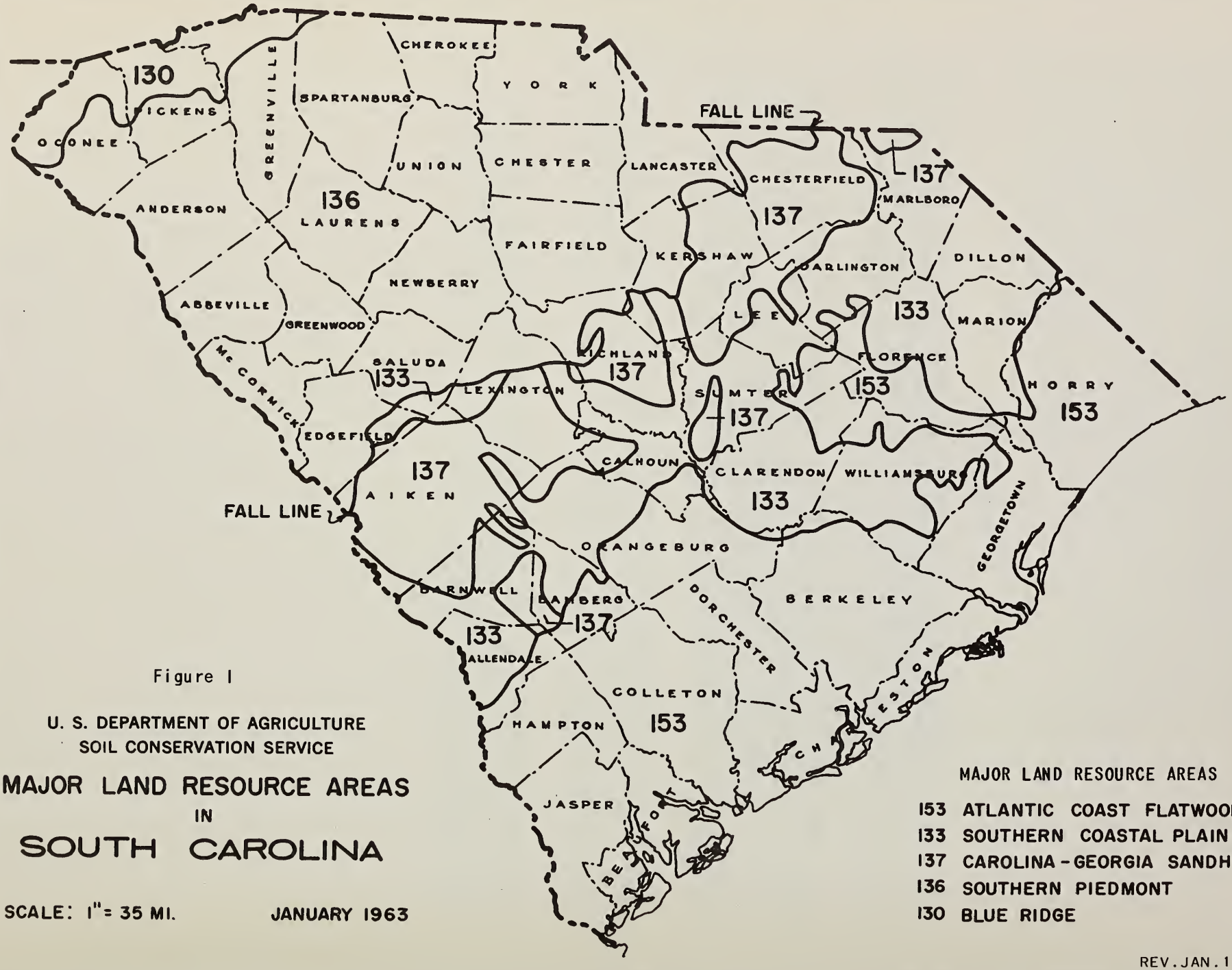

Figure I

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

MAJOR LAND RESOURCE AREAS IN SOUTH CAROLINA

SCALE: 1" = 35 MI. JANUARY 1963

MAJOR LAND RESOURCE AREAS

153 ATLANTIC COAST FLATWOODS
133 SOUTHERN COASTAL PLAIN
137 CAROLINA-GEORGIA SANDHILLS
136 SOUTHERN PIEDMONT
130 BLUE RIDGE

REV. JAN. 1963

DESCRIPTION OF THE AREA

The Southern Piedmont contains about 6,875,000 acres and extends inland from the Fall Line across South Carolina in a continuous belt 100 to 115 miles wide. It ranges in elevation from about 300 feet to about 1,200 feet.

Five major streams flow through the area in a Northwest to Southeast direction. The area has been thoroughly dissected by streams which have a dendritic drainage pattern. Interstream divides are broad and gently sloping with steep short slopes along the streams as they approach the Fall Line. Farther inland, the streams have cut deep valleys and long steep side slopes. Ridges between streams are narrow and steep.

The Southern Piedmont at one time was probably an ancient plain, containing a few remnants of an ancient mountain range that was raised to its present position from near sea level. Its rocks are very old. Its granites and other igneous rocks probably date back to the Proterozoic era and its metamorphic slates and schists to the Cambrian period of the Paleozoic era. In recent geological times, the Southern Piedmont has been dissected by streams that have cut deeper and deeper into the valleys so that it now has a rolling to hilly relief and drainage is thorough to excessive.

Annual rainfall ranges from 45 inches along the Fall Line to 60 inches near the Blue Ridge Mountains in the Northwest part of the State (Fig. 2) and frost-free days range from 240 to 220 (Fig. 3). A few days in summer have temperatures approaching 100 degrees. During the winter, temperatures of 20 degrees or below are usually of short duration. Snow and ice storms occur infrequently.

Climatic information is summarized in Figures 2, 3, 4, and 5. Data on drought in South Carolina was published by van Bavel el al (37).

Soils of the Southern Piedmont have formed on acid crystalline, basic, or mixed acid-basic rocks. They are chiefly deep to moderately deep, well drained friable to firm soils with sandy loam surface layers and sandy clay loam to clay subsoils. Extensive areas of severely eroded soils with sandy clay loam surface layers are scattered throughout.

Large areas of Red-Yellow Podzolic soils occur along with soils which intergrade toward Reddish-Brown Lateritic and Planosolic soils. Small areas of Lithosols are on steep slopes and Low-Humic Gley soils are in depressions and along streams. A few areas of Reddish-Brown Lateritic and Planosolic soils are widely distributed over the Southern Piedmont.

Soils formed on so-called "Carolina Slates" occupy a 25-mile wide area which extends across the State in a continuous belt adjacent and parallel to the Fall Line. They are chiefly moderately deep to deep, well to moderately well drained, friable to firm soils with silt loam surface layers and silty clay subsoils. Large areas of these soils have been severely eroded and they have silty clay loam surface layers.

The original upland forest in the Piedmont consisted primarily of loblolly pine, shortleaf pine, oak, hickory, and yellow-poplar. Cottonwood, sycamore, birch, willow, beech, ash, yellow-poplar and other bottomland species were common along the streams. Fruit-bearing shrubs and vines were plentiful.

In 1770 active land clearing, first, chiefly for corn and later for cotton, was well under way in the upper Coastal Plain and Piedmont. Family-size farms were common. They were usually on the better soils where hardwoods grew naturally. When crop yields decreased the farmer cleared more good land nearby, if it was available, or moved farther "up country".

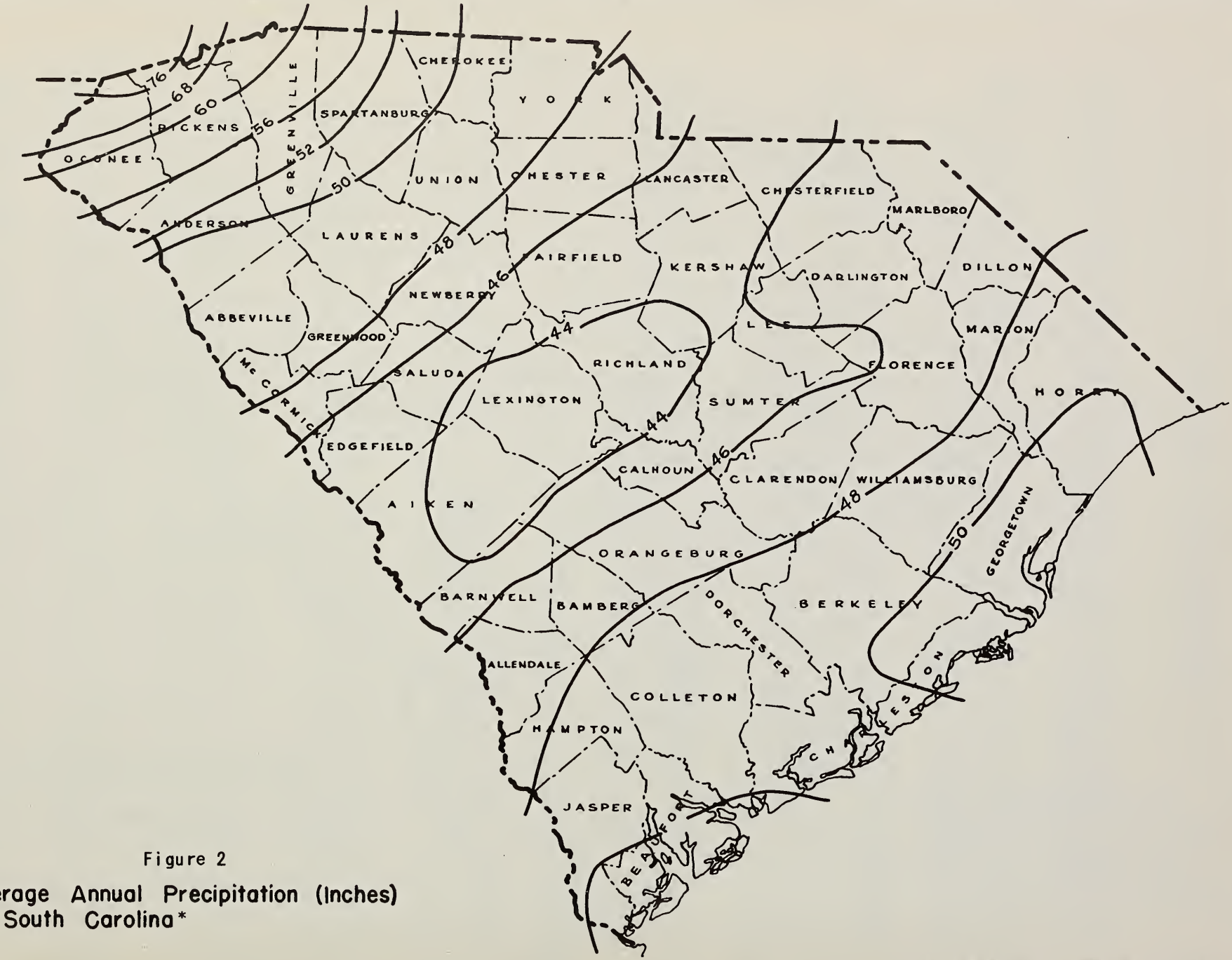

Figure 2

Average Annual Precipitation (Inches) In South Carolina*

*Basic Data by U.S. Weather Bureau

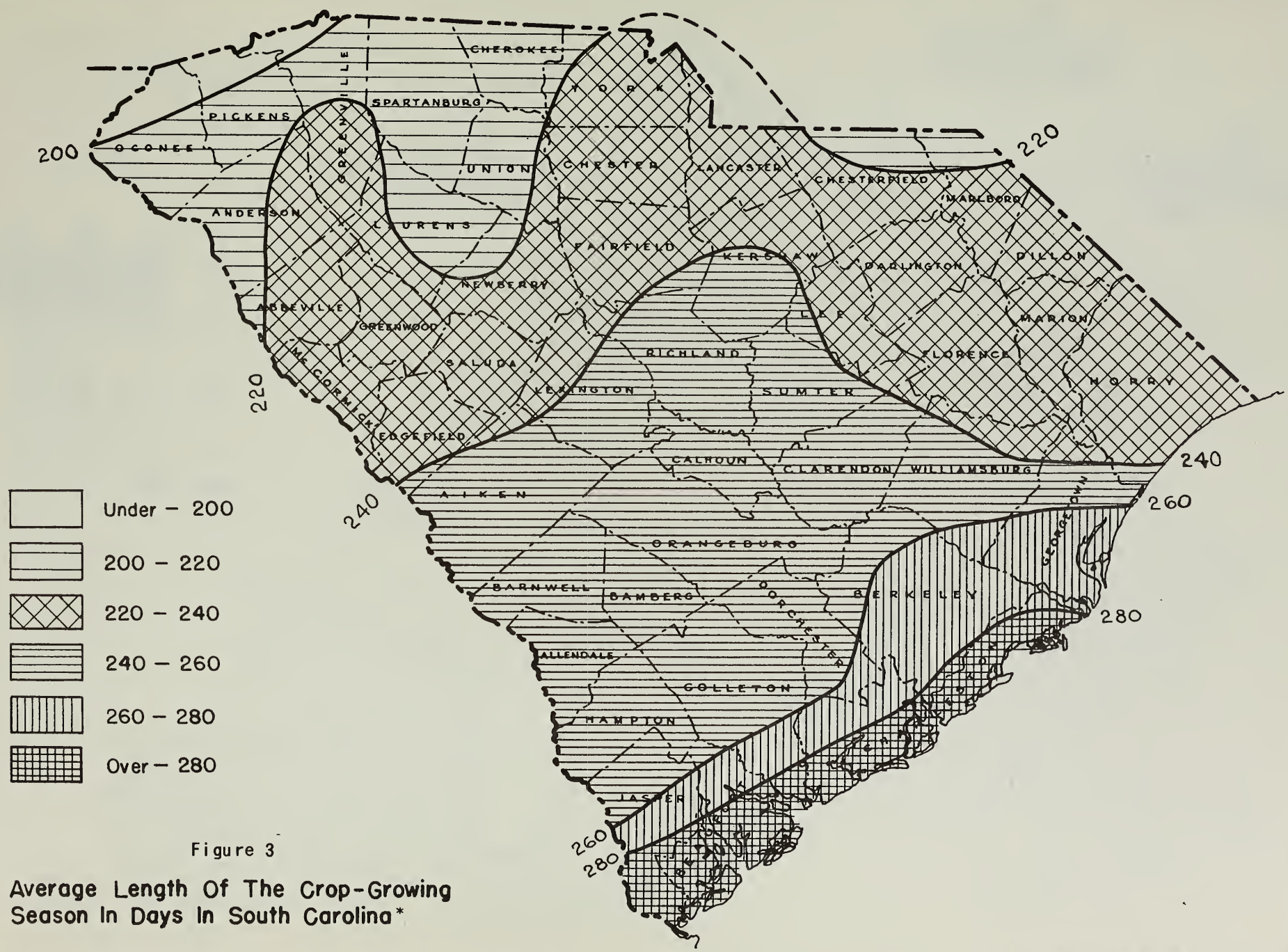

Figure 3

Average Length Of The Crop-Growing Season In Days In South Carolina*

*Basic Data by U.S. Weather Bureau

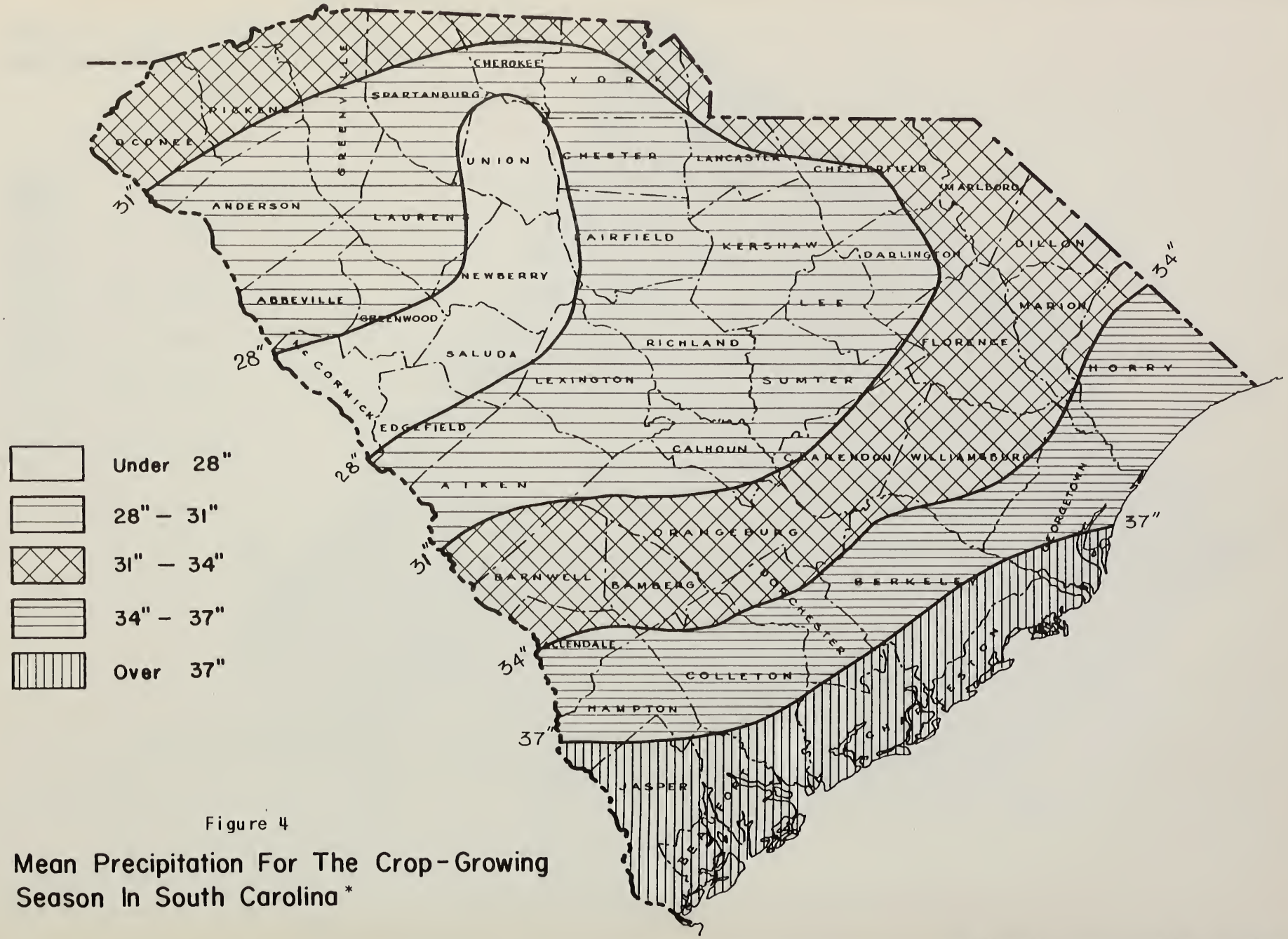

Figure 4

Mean Precipitation For The Crop-Growing Season In South Carolina*

*Basic Data by U.S. Weather Bureau

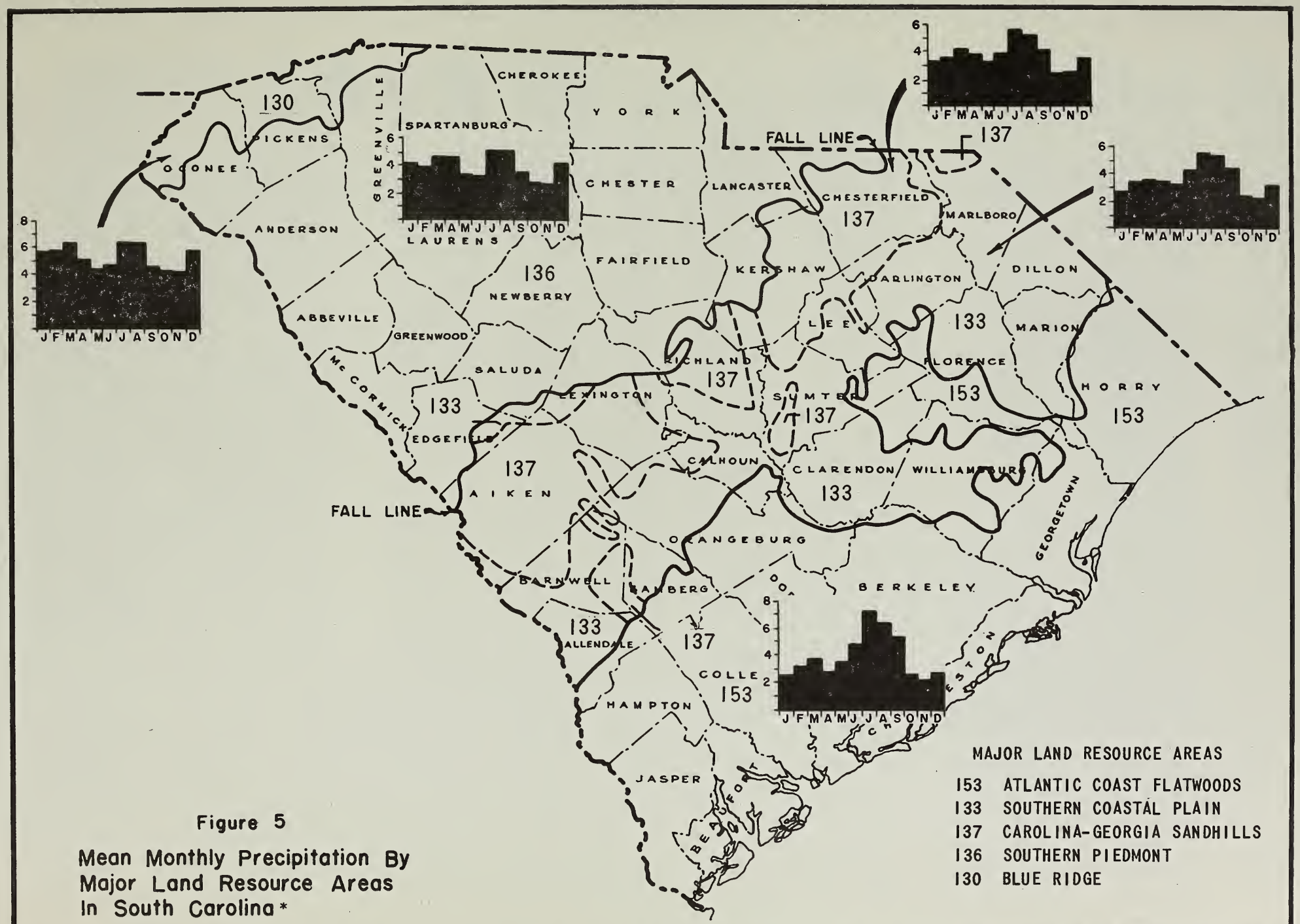

Figure 5

Mean Monthly Precipitation By Major Land Resource Areas In South Carolina*

This cycle of clearing and abandonment was repeated several times. It was intensified by a land clearing boom around 1800 following the invention of the cotton gin, by land abandonment in the Civil War reconstruction period, and again in 1921 following the appearance of the boll weevil.

The significant effect of these cycles was the conversion of most of the original mixed forests to pure pine stands, Larson (20). The abandoned farmlands usually seeded naturally to nearly pure stands of pine. As the pine trees were cut, they were replaced by hardwoods that developed underneath. The cycle was completed when the hardwoods returned. Most of these hardwoods are inferior in quality to the virgin forest, Doyle and Olson (14).

The present native forests consist of the same species but the composition of individual stands is quite different from the original forest (Fig. 6). Many of the second-growth hardwoods are scrubby and of little or no value for timber. There is a very thick undergrowth of dogwood, redbud, wild plum, sassafras, sumac, and scrub oak trees and briers in local areas.

RELATED PREVIOUS WORK

The importance of investigating the suitability of soils for tree species is well recognized, Forbes and Mayer (17), Beaufait (2). Minckler and Chapman (22) pointed out the importance of wise land use according to the natural capability of the land. They developed a planting guide based upon selection of tree species adapted to specific soil and site characteristics.

Cooper (11) investigated soil productivity in South Carolina and determined site index ratings for several Piedmont soil types. He indicated that a combination of site factors rather than a single characteristic was important and indicated that soil surveys, properly defined, appeared practical for determining site quality.

Brender and Hodges (5) observed mortality from drought on shallow poorly developed soils associated with Wilkes, Helena and Louisburg soil series. They utilized a soil survey to estimate total acreages which might be affected.

After reviewing previous soil site investigations, Bassett (1) concluded that of the many properties of site which affect tree growth, those which have been studied most and understood best are related to physical soil factors, particularly those which affect soil water-holding capacity and root development.

Coile (9) reported significant differences in site indexes for loblolly and shortleaf pines could be attributed to topographic position class (ridge, slope, and lower slope and bottom.) Soil variables contributing significantly to site index of each species were: thickness of A horizon or surface soil; ratio of silt plus clay to moisture equivalent of the B horizon; and inbibtional water value of the B horizon or subsoil.

Brender and Davis (4) observed that the rate of hardwood invasion in the lower Piedmont is strongly influenced by aspect, degree of slope, and position on slope. They concluded: (1) loblolly pine can usually be perpetuated without hardwood control on all gentle upper slopes and on moderate upper slopes with a southwestern exposure; (2) loblolly pine can be perpetuated if hardwood control measures are practiced on steep upper slopes with a southwestern exposure, moderate upper slopes with a northeastern exposure, and on all moderate lower slopes; (3) loblolly pine will be difficult, and perhaps unprofitable to perpetuate because of hardwood competition on steep upper slopes with a northeastern exposure, on all steep lower slopes, and in bottoms.

Minckler and Jensen (23) studied the influences of topographic position on upland central hardwoods and found that reproduction of oaks and hickories was better on middle and upper slopes to ridgetops and also that reproduction of yellow-poplar was best on lower northerly slopes. Specific cultural measures will often be required for optimum species composition, especially on moist sites.

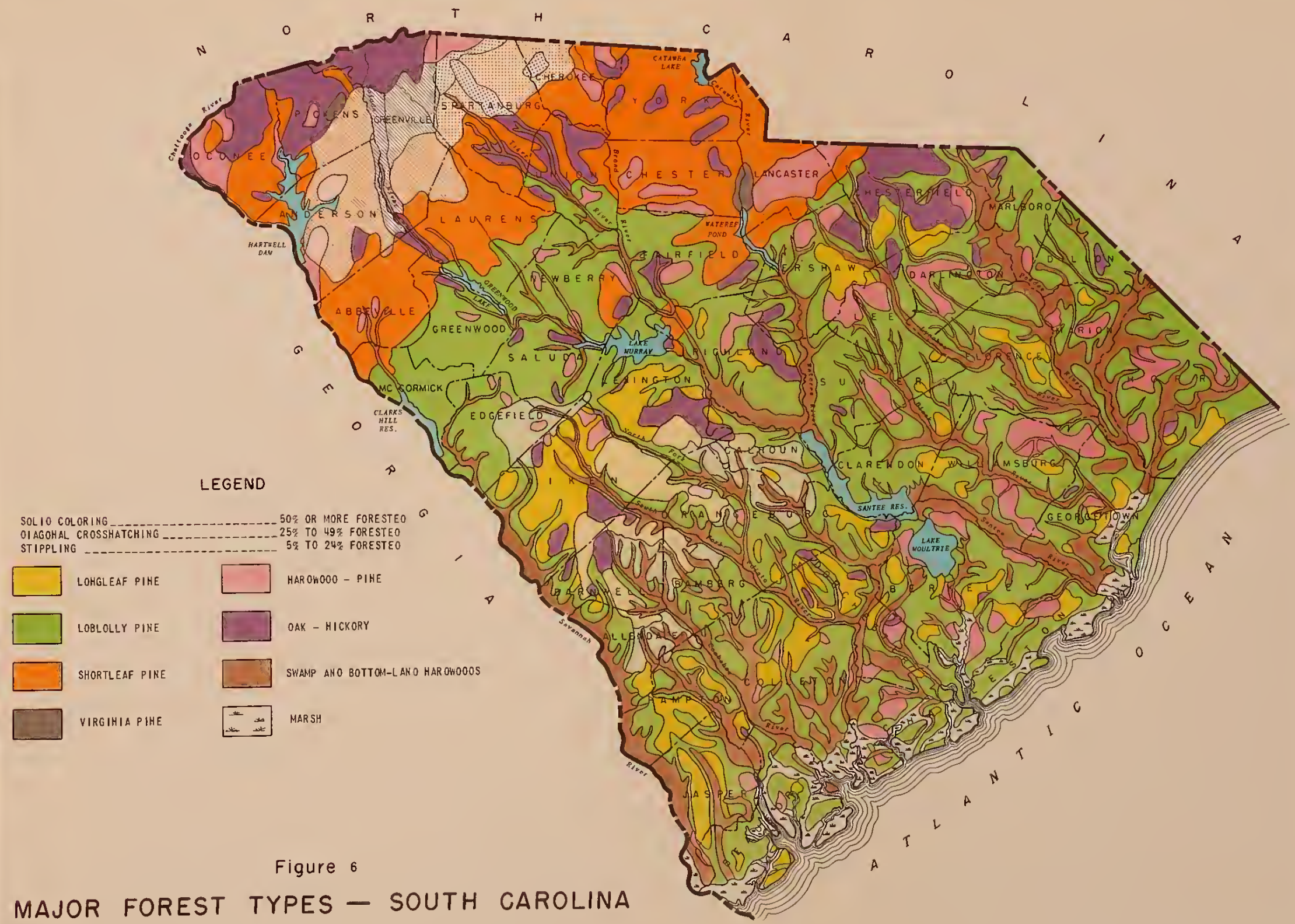

Figure 6

MAJOR FOREST TYPES — SOUTH CAROLINA

1950

FROM MAP BY U.S. DEPARTMENT OF AGRICULTURE · FOREST SERVICE
SOUTHEASTERN FOREST EXPERIMENT STATION - I. T. HAIG, DIRECTOR

Nash (24) attributed differences in tree growth partly to slope and aspect and partly to geological material from which soils were derived. Greatest rate of growth was observed on cool, moist north slopes.

Williston and Huckenpaler (38) observed the effects of slope position on survival and height growth of loblolly pine, black locust, yellow-poplar, white oak, black walnut, and white ash.

Smalley (33) reported that growth of loblolly pine was influenced by position on slope and aspect. Height growth was greatest on lower slope and least on upper slope; height growth was also greater on southeast slopes as compared to northwest slopes.

Pechanec (29) reported topography in the Piedmont presented problems but provided advantages during prescribed burning tests. Observations also indicated that soil movement was not a serious problem in burned areas on slopes of less than 15 percent in well-stocked pine stands.

Nelson, et al. (26) defined tree associations on coves and bottomlands (land classes) in the Piedmont of Georgia.

Ellersten and Allen (16) prepared site description for principal forest species in Buncombe County, North Carolina and developed a planting guide based on soil characteristics and topography.

Brinkman and Swarthout (6) observed that erosion reduced pine seedling survival only where it was severe and light erosion rather favored pine reproduction.

Goggans (18) used depth of topsoil to estimate height growth of planted slash pine and loblolly pine on well drained soils identified as Cecil, Appling, Madison, Lloyd, and Louisa series.

"Die-out" of loblolly pine in South Carolina has been related to soils that are slowly permeable and poorly aerated, Demmon (12).

Incidence of littleleaf disease has been associated with soil series. It increases as internal drainage of soils decreases. Littleleaf hazard can be predicted by knowing internal drainage characteristics and other soil information, Campbell and Copeland (7).

Zak (39) attributed littleleaf disease to root injury by *Phytophthora cinnamomi* in heavy and wet soils, aggravated by poor soil aeration and low soil fertility.

Doolittle (13) and Olson and Della-Bianca (27) developed equations relating site indexes among major species in the mixed forests of the southern Appalachians and the Virginia-Carolina Piedmont. These equations made it possible to estimate the site index of a species when the site index of another species has been determined.

Brender (3) published growth predictions for natural stands of loblolly pine in the lower Piedmont of Georgia. Multiple regression equations were developed using basal area stocking, age of stand, and site index as independent variables.

Growth and yield of six species of southern pines related to site index has been evaluated by Schumacher and Coile (31).

Chaiken and Nelson (8) found that site index of Virginia pine increased with a decrease in latitude. They developed site index curves for natural stands of Virginia pine in Maryland and the Piedmont of Virginia and the Carolinas.

Growth and yield tables have been prepared by Slocum and Miller (32) and by Nelson, Clutter, and Chaiken (25).

A cooperative study was made in 1959 by Clemson College, the South Carolina State

Commission of Forestry, and the Soil Conservation Service to determine site quality growth and yield of planted pines in the Piedmont of South Carolina, Shipman (30).

Kaufman (19) indicated that properly controlled grazing can be advantageously carried on in conjunction with forest production in Piedmont uplands.

COLLECTION OF INFORMATION

Field studies of soils and tree growth were begun by the Soil Conservation Service in 1955 and are continuing. The South Carolina State Commission of Forestry assisted in collecting data in 1958 and 1959. Soil Scientists and Foresters worked together to locate temporary plot areas and make observations, and record data.

This report is based chiefly on a study of 700 such plots distributed among many soils and the four most important pine species as follows: loblolly pine 335 plots; longleaf pine 23; shortleaf pine 316; Virginia pine 26. One hundred and fifty plots of twelve other species were measured but they are not summarized in this report. Plot locations were posted for permanent references on county highway maps which are on file in the Soil Conservation Service State Office at Columbia, South Carolina. The general distribution of plots is shown in Figure 7, and the estimated or adjusted site indexes for the separate soil types and phases are shown in Table 1.

At each plot location soils were examined and classified, and soil profiles were described according to standard procedures outlined in the Soil Survey Manual, Soil Survey Staff (34). General physiographic information such as relief, functional plot position, slope, drainage, etc. were noted, in accordance with Soil Conservation Service Soils Memorandum SCS-19, Revised. All records were made on especially designed forms to accumulate both soil and plant information.

Only dominant and co-dominant trees were selected for measurement at each site. To qualify, these trees were required to exhibit evidence of unrestricted height growth from youth. Trees measured were from 30 to 70 years of age, free from disease and injury. Stands were even-aged, naturally occurring, essentially unmanaged, and within specified stand density ranges classed as well stocked. Total height of selected trees were measured, using an Abney hand level and a 100-foot tape. Total ages were determined by counting annual rings on increment cores from borings at breast height, and adding three years to the ring count for loblolly, shortleaf, Virginia pines, and 7 years to the ring count for longleaf pine. For some trees, merchantable height and diameter at breast height were determined and recorded. Site index was determined by using published site index curves, U. S. Department of Agriculture (35); Coile and Schumacher (10). The original field record sheets are on file in the Soil Conservation Service State Office, Columbia, South Carolina.

ANALYSIS AND DISCUSSION OF DATA

Productivity and soil ratings of important limitations and hazards in woodland uses were determined for soil types and phases. These are the soil units about which the greatest number of practical and precise statements can be made concerning soil use, management, and productivity. These ratings were used to help place all soil mapping units into Woodland Suitability Groupings for practical use in woodland conservation. These groupings are discussed later. Some discussions of the items rated are in order.

Potential soil productivity for each important pine wood crop (21) was summarized (from Appendix Table) for each soil type or phase. (Table 1.) It was assumed that productive potential for slash pine would be the same as for loblolly pine. The information is by site index values. Site index is the average total height of the dominant and codominant trees in well stocked unmanaged stands at 50 years of age. It is obtained by plotting average total heights and ages of trees measured at each site on published site index curves and assigning the site index values represented by the plotted points.

Site index classes have been established and correlated with measured volume growth and yield per acre for many of our more valuable wood crops, U. S. Department of

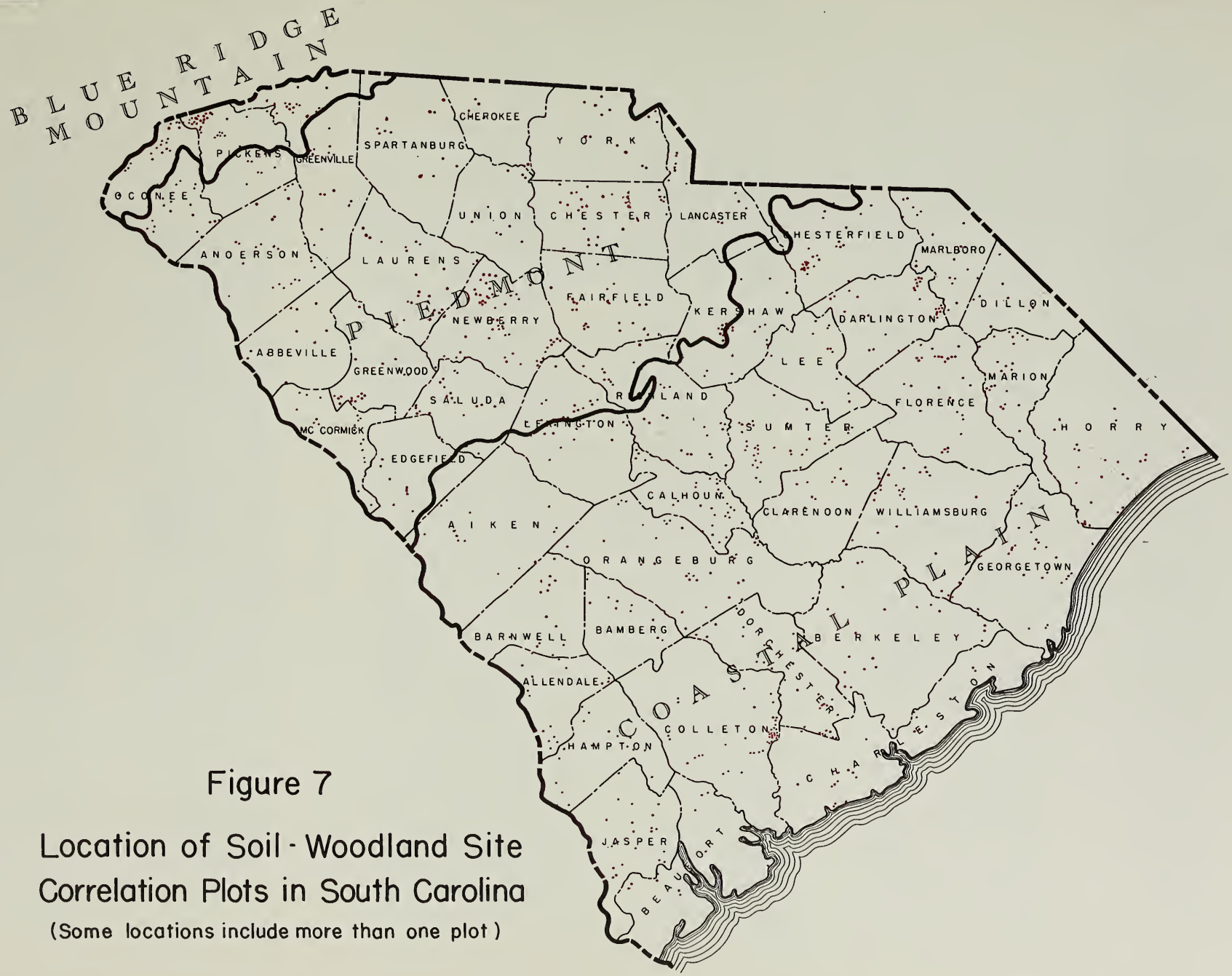

Figure 7

Location of Soil - Woodland Site Correlation Plots in South Carolina

(Some locations include more than one plot)

Agriculture (35); Schumacher and Coile (31); and Brender (3). The information is useful as an indication of potential soil productivity and is available from the above publications when soil site index correlations are determined by simple field measurements as summarized in this report. Appendix Tables 2 and 3 and Appendix Figures 1 and 2 are provided, so that average site index values for the different soils and wood crops may be translated into potential growth and yield.

It was not possible to sample every soil type or phase for each of the wood crops reported. Where data was lacking, site index values were supplied on the basis of experience, judgment, and measurements made on other species and on other soils with similar physical characteristics to assist in placing all soil mapping units into appropriate Woodland Suitability Groupings.

Plant Competition

This refers to the rate of invasion by unwanted trees, shrubs, and vines when openings are made in the canopy. Competition is slight if it does not prevent adequate natural regeneration and early growth, or interfere with the normal development of planted seedlings. Competition is moderate if it delays the establishment and slows the growth of seedlings, either naturally occurring or planted, but does not prevent the eventual development of a fully stocked, normal stand. Competition is severe if it prevents adequate restocking, either natural or artificial, without intensive preparation of the site and without special maintenance practices, including weeding.

Seedling Mortality

This refers to the expected loss of seedlings as a result of unfavorable soil characteristics or topographic features, not as a result of plant competition. Even if healthy seedlings of suitable species are correctly planted or occur naturally in adequate numbers, some will not survive if conditions are unfavorable. Ratings are based on the mortality of seedlings among the number normally planted for adequate stocking. Slight mortality is the loss of less than 25 percent of the seedlings; moderate, between 25 and 50 percent; and severe, more than 50 percent.

Equipment Limitations

Some soil characteristics and topographic features restrict or prohibit the use of conventional equipment for planting and harvesting wood crops, for constructing roads, for controlling unwanted vegetation, and for controlling fires. The limitation is slight if there is little or no restriction on the type of equipment that can be used or the time of the year that equipment can be used. The limitation is moderate if the use of equipment is restricted by one or more unfavorable characteristics, such as slope, stones or other obstructions, seasonal wetness, instability, or risk of injury to roots of trees. The limitation is severe if special equipment is needed, the use of such equipment is severely restricted by one or more unfavorable soil characteristics.

Windthrow Hazard

This refers to the danger of trees being blown over by wind. The major soil characteristics that affect tree anchorage are shallowness, stoniness, droughtiness, and wetness. The limitation is slight if no trees are blown down. The limitation is moderate if some trees are expected to blow down during periods of excessive soil wetness and high wind. The limitation is severe if many trees are expected to blow down during periods of soil wetness with moderate or high winds.

Erosion Hazard

This refers to potential soil erosion that may occur following thinning or logging operations and where the soil is exposed as along roads, fire lanes, and landings. Some soil characteristics that affect erosion hazard are slope, stability of soil aggregates, infiltration, permeability, and coarse fragments. The limitation is slight where problems of erosion control are unimportant. They are moderate where

problems of erosion control require some attention. They are severe where intensive treatments, specialized equipment and specialized methods of operation are required to minimize soil deterioration.

WOODLAND SUITABILITY GROUPS

The soils of the Southern Piedmont have been assigned to seventeen Woodland Suitability Groups as shown in Table 1a.

The ratings discussed in the preceding section and knowledge of soil characteristics were used in developing these groupings. Each group consists of soils that are quite alike in potential productivity for specified wood crops, in kind, and degree of hazards and limitations and in their management requirements for woodland uses. Table 2 shows the soils in each of these groups, the approximate productivity for four pine species in terms of site indexes, the degree of hazards or limitations when used as woodlands and lists the common and preferred wood crops for each group. More specific information on species suitability is included in the discussion following Table 2.

The remainder of the report is devoted to a detailed discussion of each Woodland Suitability Group summarized on Table 2.

Woodland Suitability Group No. 136-1

These are deep, well to moderately well drained soils with sandy loam to silt loam surface and friable clay loam to clay subsoils. They are on terraces along large streams. Infiltration is moderate and permeability is moderately slow. Moisture supplying capacity is high and the soils are low in natural fertility and contain little organic matter. Mapping units of the following soils are in this group:

Altavista fine sandy loam
Altavista silt loam

Sweetgum, yellow-poplar, blackgum, ash, sycamore, cottonwood, red maple, cherrybark oak, Shumard oak, white oak, and loblolly pine are preferred. Other suitable species include hackberry, beech, birch, American elm, winged elm, hickory, post oak, water oak, willow oak, persimmon, mulberry, and honeylocust.

These soils are suited to sawtimber and pulpwood rotations and to the production of high quality veneer and long poles and piling. Most of the species mentioned are important wildlife food producers.

Average site index of loblolly pine is 93. Approximate average annual growth per acre (board feet, Scribner, or cubic feet) of well stocked, unmanaged stands of loblolly pine at 50 years of age is 600 board feet or 130 cubic feet.

Site indexes for commercial hardwoods have not been determined. Site index of sweetgum is estimated to be approximately the same as for loblolly pine.

Plant competition is severe for pines and the intolerant hardwoods which are preferred species. Intensive treatments such as land clearing, disking, brush cutting, prescribed burning, or applying herbicides, frequently are necessary to eliminate or control competing vegetation and to prepare sites prior to establishing regeneration. Where there is no species preference, the hazard may be considered slight, and usually a well stocked stand of mixed species will develop.

Seedling mortality is generally slight. A survival of 75 percent or more of planted seedlings is expected normally. Where plant competition is controlled and seed sources are adequate, well stocked stands of natural regeneration are expected. However, these soils are subject to occasional overflow and when prolonged inundations occur during seed germination or during the growing season, mortality is severe even for water tolerant species.

TABLE 1. Average Site Index and Number of Measurements for Four Southern Pines on Some Soils of the Southern Piedmont of South Carolina. Information Summarized from Appendix Table 1.

SOIL MAPPING UNIT		SITE INDEX 2/ AND STANDARD DEVIATION			
SOIL TYPE AND PHASE	SLOPE AND EROSION CLASSES 1/	LOBLOLLY PINE	SHORTLEAF PINE	LONGLEAF PINE	VIRGINIA PINE
Alamance silt loam	A1	73 (1)	-	-	-
	B1	76±9 (5)	69 (2)	73 (1)	-
Altavista silt loam	A1	93 (2)	-	-	-
Appling sandy loam and coarse sandy loam	A1	87 (1)	-	-	-
	B1	23±10 (5)	66±8 (5)	-	70 (1)
	B2	78±3 (3)	61±8 (7)	-	67 (1)
	C1	71 (2)	62±1 (3)	-	-
	C2	70 (1)	60±4 (3)	-	-
	D1	-	58 (1)	-	-
	D2	80 (1)*	50 (1)	-	57 (1)
Appling sandy clay loam	B3	-	62 (1)	-	-
	C3	-	74 (1)	-	-
	D3	-	66 (1)	-	-
Bradley sandy loam	B1	82 (1)	-	56 (1)	-
Cataula fine sandy loam	B1	69 (1)	69 (1)	-	-
	B2	72 (2)	52±4 (3)	-	-
	C2	74±5 (3)	-	-	-
	D2	77 (1)	-	-	-
Cataula clay loam	B3	61±12 (3)	54 (2)	-	-
	C3	70 (2)	42 (1)	-	-
	D3	70 (1)	70 (1)	-	-
	E3	72 (2)	69 (1)	-	-
Cecil sandy loam	A1	85 (1)	-	-	-
	A2	88 (1)	-	-	-
	B1	73±5 (5)	66±7 (11)	-	-
	B2	77±5 (12)	64±6 (15)	-	68±4 (3)
	C1	-	66±5 (11)	-	74 (1)
	C2	77±4 (7)	66±6 (17)	-	-
	D1	-	65±7 (5)	-	78 (2)
	D2	80 (1)	64±7 (9)	-	74 (1)
	E1	-	61±6 (5)	-	-
	E2	85 (2)	66±5 (3)	-	-
	F1		68 (2)		

(See page 22 for footnotes)

TABLE 1. Average Site Index and Number of Measurements for Four Southern Pines on Some Soils of the Southern Piedmont of South Carolina. Information Summarized from Appendix Table 1.

SOIL MAPPING UNIT		SITE INDEX 2/ AND STANDARD DEVIATION			
SOIL TYPE AND PHASE	SLOPE AND EROSION CLASSES 1/	LOBLOLLY PINE	SHORTLEAF PINE	LONGLEAF PINE	VIRGINIA PINE
Cecil clay loam	B3	74±8 (8)	59±4 (7)	-	-
	C3	72±7 (4)	61±8 (13)	-	64 (1)
	D3	76±7 (10)	66±4 (7)	-	72 (1)
	E3	69 (2)	63±6 (9)	-	74 (1)
	F3	80* (1)	70±4 (6)	75 (1)	-
Chesterfield sandy loam and fine sandy loam	B1	63 (1)	-	72 (1)	-
	C1	76 (1)	70 (1)	62 (1)	-
Chewacla silt loam	A1	110 (1)	88 (1)	73 (1)	-
Colfax sandy loam	B1	-	69 (2)	-	-
	B2	75 (1)	64 (2)	-	-
	C1	-	62 (1)	-	-
Congaree fine sandy loam	A1	101±9 (3)	98 (1)	-	-
Davidson loam	B1	77 (1)	60 (2)	-	73 (1)
	B2	72±6 (3)	57 (2)	-	-
Davidson clay loam	C3	-	61 (1)	-	-
	D3	-	65 (1)	-	-
	F3	77 (2)	70 (1)	-	-
Durham sandy loam	A1	85 (1)	78 (1)	-	-
	B1	79±7 (4)	69 (1)	-	-
	C1	78 (2)	-	-	-
Durham loamy sand, thick surface	B1	66±7 (4)	-	-	-
	C1	73 (2)	-	-	-
Efland silt loam and loam	B1	-	58 (2)	65 (1)	-
	B2	81±1 (3)	-	-	-
	C2	73 (1)	-	-	-
Enon sandy loam and loam	B1	72 (1)	-	-	-
	B2	74±7 (12)	59 (1)	-	-
	C1	-	57 (1)	-	-
	C2	74±6 (5)	62±7 (3)	-	-
	D2	80 (1)	59 (2)	-	-
Enon clay loam	B3	76±5 (3)	-	-	-
	C3	-	46 (1)	-	-
	E3	62 (1)	-	-	-

TABLE 1. Average Site Index and Number of Measurements for Four Southern Pines on Some Soils of the Southern Piedmont of South Carolina. Information Summarized from Appendix Table 1.

SOIL MAPPING UNIT		SITE INDEX 2/ AND STANDARD DEVIATION			
SOIL TYPE AND PHASE	SLOPE AND EROSION CLASSES 1/	LOBLOLLY PINE	SHORTLEAF PINE	LONGLEAF PINE	VIRGINIA PINE
Georgeville silt loam	A1	87 (1)	-	-	-
	B1	77±10 (4)	60 (1)	62 (1)	-
	B2	75±5 (8)	58±6 (3)	63±5 (4)	-
	C2	84 (2)	-	-	-
	D1	88 (1)	-	72 (1)	-
	D2	65 (2)	61 (1)	63 (1)	-
	E2	-	61 (2)	-	-
	F1		79 (1)		
Georgeville silty clay loam	B3	74±7 (5)	66±6 (6)	-	-
	C3	69±2 (3)	66±3 (4)	70 (1)	-
	D3	68 (2)	59 (1)	-	-
Goldston silt loam	B2	75 (2)	48 (1)	-	-
	C2	79±7 (3)	67 (2)	-	-
	D2	-	64±6 (3)	73 (2)	-
	E2	67 (1)	64 (1)		
	F2	75±6 (3)	74 (1)		
Gullied land, firm material	D4	-	45±3 (3)	55 (1)	-
	E4	77 (1)	69 (1)	-	-
	F4	73 (2)	-	-	-
Gullied land, friable material	C4	66 (1)	60±6 (3)	-	58 (1)
	E4	-	55 (2)	-	-
Helena sandy loam and coarse sandy loam	A2	83 (1)	-	-	-
	B1	84 (2)	-	-	-
	B2	79±4 (3)	53 (1)	-	-
	C1	91* (2)	50 (1)	-	-
	C2	69±6 (3)	57 (1)	-	-
	E2	78* (2)	-	-	-
Herndon silt loam	B1	81±7 (8)	66±3 (4)	69±5 (3)	-
	B2	73±4 (5)	-	66 (1)	-
	C1	68 (2)	52 (1)	62 (1)	-
	C2	78±6 (7)	63±6 (4)	-	-
	D1	-	-	60 (1)	-
	D2	76 (1)	55 (1)	-	-

TABLE 1. Average Site Index and Number of Measurements for Four Southern Pines on Some Soils of the Southern Piedmont of South Carolina. Information Summarized from Appendix Table 1.

SOIL MAPPING UNIT		SITE INDEX 2/ AND STANDARD DEVIATION			
SOIL TYPE AND PHASE	SLOPE AND EROSION CLASSES 1/	LOBLOLLY PINE	SHORTLEAF PINE	LONGLEAF PINE	VIRGINIA PINE
Herndon silty clay loam	B3	56 (1)	54 (2)	-	-
	C3	91* (1)	56 (1)	-	-
Hiwassee sandy loam, fine sandy loam, and loam	B1	88 (1)	87 (1)	-	87 (1)
	B2	79 (1)	73 (1)	-	-
	D2	67 (1)	-	-	-
Hiwassee clay loam	B3	72 (1)	61 (1)	-	-
	E3	68 (1)	61 (1)	-	-
Iredell sandy loam and loam	A1	-	52 (2)	-	-
	B2	62 (1)	62 (1)	-	-
Lloyd sandy loam, fine sandy loam, and loam	A1	95* (1)	-	-	-
	A2	71 (1)	-	-	-
	B1	78 (1)	67 (2)	-	-
	B2	78±4 (6)	70 (2)	-	-
	C1	-	59±6 (3)	-	-
	C2	78±6 (6)	63 (1)	-	-
	D1	-	62 (1)	-	-
	D2	-	74 (2)	-	-
	E2	92* (1)	73±3 (3)	-	-
	F1	-	79 (1)	-	-
Lloyd clay loam and sandy clay loam	B3	93 (1)	62 (1)	-	58 (1)
	C3	70±7 (4)	64±7 (5)	-	-
	D3	71 (2)	61 (1)	-	67 (2)
	E3	-	66 (1)	-	-
Local alluvial land, well drained	A1	92±10 (10)	69±6 (3)	-	-
	B1	88±4 (5)	68 (1)	-	-
Lockhart sandy loam and coarse sandy loam	B2	76 (2)	72 (1)	-	-
	C1	85 (1)	-	-	-
	C2	73 (2)	67±2 (3)	-	-
	D1	74 (1)	70 (1)	-	-
	E1	-	60 (2)	-	-
Lockhart clay loam	B3	85* (1)	-	-	-
	C3	71 (1)	55 (1)	-	-
Louisa clay loam	D3	-	68* (1)	-	-

TABLE 1. Average Site Index and Number of Measurements for Four Southern Pines on Some Soils of the Southern Piedmont of South Carolina. Information Summarized from Appendix Table 1.

SOIL MAPPING UNIT		SITE INDEX 2/ AND STANDARD DEVIATION			
SOIL TYPE AND PHASE	SLOPE AND EROSION CLASSES 1/	LOBLOLLY PINE	SHORTLEAF PINE	LONGLEAF PINE	VIRGINIA PINE
Louisburg sandy loam	B2	71 (1)	58 (1)	-	-
	C2	-	76 (1)	-	-
	D2	77 (2)	-	-	-
	E2	97* (1)	77±4 (3)	-	81±3 (3)
	F2	-	76 (1)	-	83 (1)
Madison sandy loam	B2	63±2 (4)	68 (2)	-	-
	C1	-	53 (1)	-	-
	C2	56 (2)	-	-	-
	D2	-	67 (2)	-	-
	E2	-	58 (1)	-	-
	F2	-	55 (1)	-	-
Madison clay loam	B3	-	64 (1)	-	-
	C3	-	64 (2)	-	-
Masada fine sandy loam	C1	-	81* (1)	-	77* (1)
Mecklenburg sandy loam and loam	B2	77* (1)	-	-	-
	C1	-	79* (1)	-	-
	C2	81 (1)	-	-	-
	D2	74 (1)	-	-	-
Mecklenburg clay loam	B3	-	45 (1)	-	-
	C3	-	57 (1)	-	-
Mixed alluvial land, well drained	A1	84 (1)	88 (1)	-	-
Mixed alluvial land, poorly drained	A1	94 (1)	77 (1)	-	-
Orange silt loam	A1	65 (1)	-	-	-
	B2	69 (1)	-	-	-
Roanoke sandy loam and silt loam	A1	91 (1)	-	-	-
Tatum silt loam	B2	-	63±4 (4)	-	78 (1)
	C2	-	85 (1)	-	-
Tatum silty clay	B3	-	78 (1)	-	-
Tirzah silt loam	C2	87 (1)	-	-	-
	E2	95 (1)	-	-	-
Tirzah silty clay loam	D3	72 (2)	-	-	-
Vance sandy loam	B2	66 (1)	59 (1)	-	-
	C1	81 (1)	-	-	-

TABLE 1. Average Site Index and Number of Measurements for Four Southern Pines on Some Soils of the Southern Piedmont of South Carolina. Information Summarized from Appendix Table 1.

SOIL MAPPING UNIT		SITE INDEX 2/ AND STANDARD DEVIATION			
SOIL TYPE AND PHASE	SLOPE AND EROSION CLASSES 1/	LOBLOLLY PINE	SHORTLEAF PINE	LONGLEAF PINE	VIRGINIA PINE
Wehadkee silt loam	A1	107 (2)	-	-	-
Wickham sandy loam and loamy sand	B2	95 (1)	-	-	-
	C1	95 (1)	-	-	-
Wickham sandy clay loam	F3	67 (1)	63 (1)	-	-
Wilkes sandy loam	C2	70 (2)	-	-	-
	E2	74 (1)	-	-	-
	F2	70 (2)	-	-	-
Worsham sandy loam and silt loam	A1	-	-	70 (1)	-
	B1	-	66 (1)	-	-
	D2	-	71 (1)	-	-

1/ Explanation of slope and erosion classes:
A = 0 to 2 percent slopes, nearly level
B = 2 to 6 percent slopes, gently sloping
C = 6 to 10 percent slopes, sloping
D = 10 to 15 percent slopes, strongly sloping
E = 15 to 25 percent slopes, moderately steep
F = 25 percent slopes and over, steep

Erosion classes:
1 = None to slight; 75 percent or more of original surface soil or plow layer (in soils having thin surfaces) remaining.
2 = Moderate; approximately 25 to 75 percent of the original A horizon or surface soil remaining.
3 = Severe; more than 75 percent of the original plow layer or A horizon and up to 25 percent of the subsoil lost.
4 = Moderately gullied; soils have moderately deep or deep gullies occupying 15 to 40 percent of the area. Areas between gullies may have Class 1, 2, or 3 erosion.

2/ Average site indexes are summarized from Appendix Table 1. Where 3 or more measurements were available the standard deviation (plus or minus) is shown. Values in parentheses indicate the number of measurements available. A dash (-) indicates no plot data available.

* Indicates moist site.

TABLE 1a. INDEX TO WOODLAND SUITABILITY GROUPINGS OF SOILS

Soil Mapping Unit		Woodland Suitability Group Number
Soil Type and Phase	Slope & Erosion Classes 1/	
Alamance silt loam	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6
	C2	136-6
	D1	136-6
	D2	136-6
Alamance silty clay loam	B3	136-8
	C3	136-8
	D3	136-8
Altavista silt loam	A1	136-1
	A2	136-1
	B1	136-1
	B2	136-1
	C1	136-1
	C2	136-1
Appling sandy loam and coarse sandy loam	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6
	C2	136-6
	D1	136-6
	D2	136-6
Appling sandy clay loam	B3	136-8
	C3	136-8
	D3	136-8
Appling sandy loam, shallow solum	B1	136-14
	B2	136-14
	C1	136-14
	C2	136-14
	D1	136-14
	D2	136-14
Appling sandy loam, thick surface	A1	136-14
	A2	136-14
	B1	136-14
	B2	136-14
	C1	136-14
	C2	136-14
	D1	136-14
	D2	136-14
Appling very stony sandy loam	B1	136-14
	B2	136-14
	C1	136-14
	C2	136-14
	D1	136-14
	D2	136-14

Soil Mapping Unit		Woodland Suitability Group Number
Soil Type and Phase	Slope & Erosion Classes 1/	
Augusta sandy loam	A1	136-3
Bradley sandy loam	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6
	C2	136-6
	D1	136-6
	D2	136-6
Bradley sandy clay loam	B3	136-8
	C3	136-8
	D3	136-8
Buncombe loamy sand	A1	136-14
	B1	136-14
Cataula fine sandy loam	A1	136-12
	A2	136-12
	B1	136-12
	B2	136-12
	C1	136-12
	C2	136-12
	D1	136-12
	D2	136-12
	E1	136-12
	E2	136-12
	F1	136-12
	F2	136-12
Cataula clay loam	B3	136-11
	C3	136-11
	D3	136-11
	E3	136-11
	F3	136-11
Cecil sandy loam	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6
	C2	136-6
	D1	136-6
	D2	136-6
	E1	136-7
	E2	136-7
	F1	136-7
	F2	136-7
Cecil clay loam	B3	136-8
	C3	136-8
	D3	136-8
	E3	136-9
	F3	136-9

(See page 28 for footnotes)

TABLE 1a. INDEX TO WOODLAND SUITABILITY GROUPINGS OF SOILS

Soil Mapping Unit		Woodland Suitability Group Number
Soil Type and Phase	Slope & Erosion Classes 1/	
Chesterfield sandy loam and fine sandy loam	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6
	C2	136-6
	D1	136-6
	D2	136-6
Chesterfield sandy clay loam	B3	136-8
	C3	136-8
	D3	136-8
Chewacla silt loam	A1	136-3
Colfax sandy loam	A1	136-16
	A2	136-16
	B1	136-16
	B2	136-16
	C1	136-16
	C2	136-16
Congaree fine sandy loam	A1	136-2
	B1	136-2
Davidson loam	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6
	C2	136-6
	D1	136-6
	D2	136-6
	E1	136-7
	E2	136-7
	F1	136-7
	F2	136-7
Davidson clay loam	B3	136-8
	C3	136-8
	D3	136-8
	E3	136-9
	F3	136-9
Durham sandy loam	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6
	C2	136-6
	D1	136-6
	D2	136-6
Durham sandy clay loam	B3	136-8
	C3	136-8
	D3	136-8
Durham loamy sand, thick surface	A1	136-14
	B1	136-14
	C1	136-14
Edgemont very stony sandy loam	D1	136-13
	D2	136-13
	E1	136-13
	E2	136-13
Efland silt loam and loam	A1	136-15
	A2	136-15
	B1	136-15
	B2	136-15
	C1	136-15
	C2	136-15
	D1	136-15
	D2	136-15
Efland silty clay loam	B3	136-11
	C3	136-11
	D3	136-11
Elbert silt loam	A1	136-16
	B1	136-16
Enon sandy loam and loam	A1	136-12
	A2	136-12
	B1	136-12
	B2	136-12
	C1	136-12
	C2	136-12
	D1	136-12
	D2	136-12
	E1	136-12
	E2	136-12
Enon clay loam	B3	136-11
	C3	136-11
	D3	136-11
	E3	136-11
Georgeville silt loam	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6
	C2	136-6
	D1	136-6
	D2	136-6
	E1	136-7
	E2	136-7
Georgeville silty clay loam	B3	136-8
	C3	136-8
	D3	136-8
	E3	136-9
Goldston silt loam	B2	136-13
	C2	136-13
	D2	136-13
	E2	136-13
	F2	136-13

TABLE 1a. INDEX TO WOODLAND SUITABILITY GROUPINGS OF SOILS

Soil Mapping Unit		Woodland Suitability Group Number
Soil Type and Phase	Slope & Erosion Classes 1/	
Gullied land, firm material	B4	136-17
	C4	136-17
	D4	136-17
	E4	136-17
	F4	136-17
Gullied land, friable material	B4	136-17
	C4	136-17
	D4	136-17
	E4	136-17
	F4	136-17
Helena sandy loam and coarse sandy loam	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6
	C2	136-6
	D1	136-6
	D2	136-6
	E1	136-7
	E2	136-7
Helena sandy clay loam	B3	136-8
	C3	136-8
	D3	136-8
	E3	136-8
Helena sandy loam, thick surface	A1	136-14
	A2	136-14
	B1	136-14
	B2	136-14
	C1	136-14
	C2	136-14
	D1	136-14
	D2	136-14
Herndon silt loam	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6
	C2	136-6
	D1	136-6
	D2	136-6
	E1	136-7
	E2	136-7
Herndon silty clay loam	B3	136-8
	C3	136-8
	D3	136-8
	E3	136-9
Hiwassee sandy loam, fine sandy loam and loam	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6
	C2	136-6
Hiwassee sandy loam, fine sandy loam and loam (cont'd.)	D1	136-6
	D2	136-6
	E1	136-7
	E2	136-7
	F1	136-7
	F2	136-7
Hiwassee clay loam	B3	136-8
	C3	136-8
	D3	136-8
	E3	136-9
	F3	136-9
Iredell sandy loam and loam	A1	136-10
	A2	136-10
	B1	136-10
	B2	136-10
	C1	136-10
	C2	136-10
	D1	136-10
	D2	136-10
Iredell clay loam	B3	136-11
	C3	136-11
	D3	136-11
Lloyd sandy loam, fine sandy loam and loam	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6
	C2	136-6
	D1	136-6
	D2	136-6
	E1	136-7
	E2	136-7
	F1	136-7
	F2	136-7
Lloyd clay loam	B3	136-8
	C3	136-8
	D3	136-8
	E3	136-9
	F3	136-9
Lloyd sandy loam, compact subsoil	A1	136-12
	A2	136-12
	B1	136-12
	B2	136-12
	C1	136-12
	C2	136-12
	D1	136-12
	D2	136-12
	E1	136-12
	E2	136-12
	F1	136-12
	F2	136-12

TABLE 1a. INDEX TO WOODLAND SUITABILITY GROUPINGS OF SOILS

Soil Mapping Unit		Woodland Suitability Group Number
Soil Type and Phase	Slope & Erosion Classes 1/	
Lloyd clay loam, compact subsoil	B3	136-11
	C3	136-11
	D3	136-11
	E3	136-11
	F3	136-11
Local alluvial land	A1	136-2
	B1	136-2
Lockhart sandy loam and coarse sandy loam	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6
	C2	136-6
	D1	136-6
	D2	136-6
	E1	136-7
	E2	136-7
	F1	136-7
	F2	136-7
Lockhart clay loam	B3	136-8
	C3	136-8
	D3	136-8
	E3	136-9
	F3	136-9
Louisa sandy loam	B2	136-13
	C2	136-13
	D2	136-13
	E2	136-13
Louisa clay loam	B3	136-8
	C3	136-8
	D3	136-8
	E3	136-9
Louisburg sandy loam	B2	136-13
	C2	136-13
	D2	136-13
	E2	136-13
	F2	136-13
Louisburg sandy loam, deeply weathered	B2	136-14
	C2	136-14
	D2	136-14
	E2	136-14
Madison sandy loam	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6
	C2	136-6
	D1	136-6
	D2	136-6
	E1	136-7
	E2	136-7
	F1	136-7
	F2	136-7
Madison clay loam	B3	136-8
	C3	136-8
	D3	136-8
	E3	136-9
	F3	136-9
Manteo silt loam	B2	136-13
	C2	136-13
	D2	136-13
	E2	136-13
	F2	136-13
Masada fine sandy loam	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6
	C2	136-6
Mayodan silt loam	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6
	C2	136-6
	D1	136-6
	D2	136-6
Mecklenburg sandy loam and loam	A1	136-15
	A2	136-15
	B1	136-15
	B2	136-15
	C1	136-15
	C2	136-15
	D1	136-15
	D2	136-15
	E1	136-15
	E2	136-15
Mecklenburg clay loam	B3	136-11
	C3	136-11
	D3	136-11
	E3	136-11
Mixed alluvial land, well drained	A1	136-2
	B1	136-2
Mixed alluvial land, poorly drained	A1	136-4
Molena loamy sand	A1	136-14
	B1	136-14
	C1	136-14
	D1	136-14
Nason silt loam	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6

TABLE 1a. INDEX TO WOODLAND SUITABILITY GROUPINGS OF SOILS

Soil Mapping Unit		Woodland Suitability Group Number
Soil Type and Phase	Slope & Erosion Classes 1/	
Nason silt loam (cont'd.)	C2	136-6
	D1	136-6
	D2	136-6
	E1	136-7
	E2	136-7
Nason silty clay loam	B3	136-8
	C3	136-8
	D3	136-8
	E3	136-9
Orange silt loam	A1	136-10
	A2	136-10
	B1	136-10
	B2	136-10
	C1	136-10
	C2	136-10
	D1	136-10
	D2	136-10
Orange silty clay	B3	136-11
	C3	136-11
	D3	136-11
Penn silt loam	B2	136-13
	C2	136-13
	D2	136-13
	E2	136-13
	F2	136-13
Roanoke sandy loam and silt loam	A1	136-16
State fine sandy loam	A1	136-2
	B1	136-2
Tatum silt loam	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6
	C2	136-6
	D1	136-6
	D2	136-6
	E1	136-7
	E2	136-7
	F1	136-7
	F2	136-7
Tatum silty clay	B3	136-8
	C3	136-8
	D3	136-8
	E3	136-9
	F3	136-9
Tirzah silt loam	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6
	C2	136-6
Tirzah silt loam (cont'd.)	D1	136-6
	D2	136-6
	E1	136-7
	E2	136-7
Tirzah silty clay loam	B3	136-8
	C3	136-8
	D3	136-8
	E3	136-9
Vance sandy loam	A1	136-12
	A2	136-12
	B1	136-12
	B2	136-12
	C1	136-12
	C2	136-12
	D1	136-12
	D2	136-12
	E1	136-12
	E2	136-12
	F1	136-12
	F2	136-12
Vance clay loam	B3	136-11
	C3	136-11
	D3	136-11
	E3	136-11
	F3	136-11
Wadesboro silt loam	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6
	C2	136-6
	D1	136-6
	D2	136-6
Wadesboro silty clay loam	B3	136-8
	C3	136-8
	D3	136-8
Wehadkee silt loam	A1	136-4
White Store silt loam	A1	136-10
	A2	136-10
	B1	136-10
	B2	136-10
	C1	136-10
	C2	136-10
Wickham sandy loam and loamy sand	A1	136-5
	A2	136-5
	B1	136-5
	B2	136-5
	C1	136-6
	C2	136-6
	D1	136-6
	D2	136-6
	E1	136-7

TABLE 1a. INDEX TO WOODLAND SUITABILITY GROUPINGS OF SOILS

Soil Mapping Unit		Woodland Suitability Group Number
Soil Type and Phase	Slope & Erosion Classes 1/	
Wickham sandy loam and loamy sand (cont'd.)	E2	136-7
	F1	136-7
	F2	136-7
Wickham sandy clay loam	B3	136-8
	C3	136-8
	D3	136-8
	E3	136-9
	F3	136-9
Wilkes sandy loam	B2	136-13
	C2	136-13
	D2	136-13
	E2	136-13
	F2	136-13
Worsham sandy loam and silt loam	A1	136-16
	A2	136-16
	B1	136-16
	B2	136-16
	C1	136-16
	C2	136-16
	D1	136-16
	D2	136-16
	E1	136-16
	E2	136-16
Worsham sandy clay loam	B3	136-11
	C3	136-11
	D3	136-11
	E3	136-11

1/ Explanation of slope and erosion classes:

Slope classes:

A = 0 - 2% slopes, nearly level
B = 2 - 6% slopes, gently sloping
C = 6 - 10% slopes, sloping
D = 10 - 15% slopes, strongly sloping
E = 15 - 25% slopes, moderately steep
F = 25% slopes and over, steep

Erosion classes:

1 None to slight; 75% or more of original surface soil or plow layer (in soils having thin surfaces) remaining.

2 Moderate; approximately 25% to 75% of the original A horizon or surface soil remaining.

3 Severe; more than 75% of the original plow layer or A horizon and up to 25% of the subsoil lost.

4 Moderately gullied; soils have moderately deep or deep gullies occupying 15% to 40% of the area. Areas between gullies may have Class 1, 2, or 3 erosion.

Table 2 - Woodland Suitability Groupings of Soils with Interpretations for Management and Treatment Southern Piedmont of South Carolina (Major Land Resource Area 136)

GROUP NO.	SOIL MAPPING UNIT		POTENTIAL SOIL PRODUCTIVITY - SITE INDEX AT 50 YEARS [2]				INTERPRETATIONS FOR WOODLAND CONSERVATION [3]					SUITABLE WOODCROPS
	SOIL SERIES, TYPE, AND PHASE	SLOPE AND EROSION CLASSES [1]	LOBLOLLY PINE	SHORTLEAF PINE	LONGLEAF PINE	VIRGINIA PINE	PLANT COMPETITION	SEEDLING MORTALITY	EQUIPMENT LIMITATIONS	WINDTHROW HAZARD	EROSION HAZARD	
136-1	Altavista fine sandy loam Altavista silt loam	A1, 2 B1, 2 C1, 2	93 (2)	-	-	-	Slight or severe	Slight to severe	Slight to moderate	Slight	Slight	Pines and Lowland Hardwoods
136-2	Congaree sandy loam Congaree fine sandy loam Congaree silt loam Local alluvial land, well drained Mixed alluvial land, well drained Starr loam State fine sandy loam	A1 B1	92 (19)	79 (5)	-	-	Slight or severe	Slight	Moderate	Slight	Slight	Pines and Lowland Hardwoods
136-3	Augusta fine sandy loam Augusta silt loam Chewacla fine sandy loam Chewacla fine silt loam	A1	110* (1)	88 (1)	73 (1)	-	Slight to severe	Slight to severe	Moderate to severe	Slight	Slight	Pines and Lowland Hardwoods
136-4	Mixed alluvial land, poorly drained Wehadkee fine sandy loam Wehadkee silt loam	A1	102 (3)	77 (1)	-	-	Slight to severe	Severe	Severe	Severe	Slight	Pines and Lowland Hardwoods
136-5	Alamance silt loam Appling sandy loam Appling coarse sandy loam Appling gravelly sandy loam Bradley sandy loam Cecil sandy loam Cecil gravelly sandy loam Chesterfield sandy loam Davidson loam Durham sandy loam Georgeville silt loam Helena sandy loam Helena coarse sandy loam Herndon silt loam Hiwassee sandy loam Lloyd sandy loam Lloyd loam Lockhart sandy loam Masada fine sandy loam Madison sandy loam Madison gravelly sandy loam Mayodan silt loam Nason silt loam Tatum silt loam Tirzah silt loam Wadesboro silt loam Wickham sandy loam	A1, 2 B1, 2	76 (94)	65 (67)	55 (11)	73 (6)	Severe	Slight	Slight to moderate	Slight	Slight to moderate	Pines and Upland Hardwoods
136-6	Alamance silt loam Appling sandy loam Appling coarse sandy loam Appling gravelly sandy loam Bradley sandy loam Cecil sandy loam Cecil gravelly sandy loam Chesterfield sandy loam Davidson loam Durham sandy loam Georgeville silt loam Helena sandy loam Helena coarse sandy loam Herndon silt loam Hiwassee sandy loam Lloyd sandy loam Lloyd loam Lockhart sandy loam Madison sandy loam Madison gravelly sandy loam	C1, 2 D1, 2	75 (50)	64 (75)	64 (4)	73 (6)	Severe	Slight	Slight to severe	Slight to moderate	Slight to severe	Pines and Upland Hardwoods

(See page 32 for footnotes)

Table 2 - Woodland Suitability Groupings of Soils with Interpretations for Management and Treatment Southern Piedmont of South Carolina (Major Land Resource Area 136)

GROUP NO.	SOIL MAPPING UNIT		POTENTIAL SOIL PRODUCTIVITY - SITE INDEX AT 50 YEARS [2]				INTERPRETATIONS FOR WOODLAND CONSERVATION [3]					SUITABLE WOODCROPS
	SOIL SERIES, TYPE, AND PHASE	SLOPE AND EROSION CLASSES [1]	LOBLOLLY PINE	SHORTLEAF PINE	LONGLEAF PINE	VIRGINIA PINE	PLANT COMPETITION	SEEDLING MORTALITY	EQUIPMENT LIMITATIONS	WINDTHROW HAZARD	EROSION HAZARD	
136-6 (Cont.)	Masada fine sandy loam Mayodan silt loam Nason silt loam Tatum silt loam Tirzah silt loam Wadesboro silt loam Wickham sandy loam	C1, 2 D1, 2	75 (50)	64 (75)	64 (4)	73 (6)	Severe	Slight	Slight to severe	Slight to moderate	Slight to severe	Pines and Upland Hardwoods
136-7	Alamance silt loam Appling sandy loam Appling gravelly sandy loam Bradley sandy loam Cecil sandy loam Cecil gravelly sandy loam Chesterfield sandy loam Davidson loam Durham sandy loam Georgeville silt loam Helena sandy loam Helena coarse sandy loam Herndon silt loam Hiwassee sandy loam Lloyd sandy loam Lloyd loam Lockhart sandy loam Madison sandy loam Madison gravelly sandy loam Mayodan silt loam Nason silt loam Tatum silt loam Tirzah silt loam Wadesboro silt loam Wickham sandy loam	E1, 2 F1, 2	83 (5)	65 (20)	-	-	Severe	Slight	Severe	Slight	Severe	Pines and Upland Hardwoods
136-8	Alamance silty clay loam Appling sandy clay loam Bradley sandy clay loam Cecil clay loam Chesterfield sandy clay loam Davidson clay loam Durham sandy clay loam Georgeville silty clay loam Helena sandy clay loam Herndon silty clay loam Hiwassee clay loam Lloyd clay loam Lockhart clay loam Louisa clay loam Madison clay loam Nason silty clay loam Tatum silty clay loam Tirzah silty clay loam Wadesboro silty clay loam Wickham sandy clay loam	B3 C3 D3	73 (46)	63 (60)	70 (1)	66 (5)	Slight to severe	Slight to severe	Slight to severe	Slight to severe	Severe	Pines and Upland Hardwoods
136-9	Alamance silty clay loam Appling sandy clay loam Bradley sandy clay loam Cecil clay loam Chesterfield sandy clay loam Davidson clay loam Durham sandy clay loam Georgeville silty clay loam Herndon silty clay loam Hiwassee clay loam Lloyd clay loam Lockhart clay loam	E3 F3	72 (7)	66 (20)	65 (1)	-	Slight to severe	Slight to severe	Severe	Moderate	Severe	Pines and Upland Hardwoods

DUE JUN 23 1965

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Table 2 - Woodland Suitability Groupings of Soils with Interpretations for Management and Treatment Southern Piedmont of South Carolina (Major Land Resource Area 136)

GROUP NO.	SOIL MAPPING UNIT		POTENTIAL SOIL PRODUCTIVITY - SITE INDEX AT 50 YEARS [2]				INTERPRETATIONS FOR WOODLAND CONSERVATION [3]					SUITABLE WOODCROPS
	SOIL SERIES, TYPE, AND PHASE	SLOPE AND EROSION CLASSES [1]	LOBLOLLY PINE	SHORTLEAF PINE	LONGLEAF PINE	VIRGINIA PINE	PLANT COMPETITION	SEEDLING MORTALITY	EQUIPMENT LIMITATIONS	WINDTHROW HAZARD	EROSION HAZARD	
136-9 (Cont.)	Louisa clay loam Madison clay loam Nason silty clay loam Tatum silty clay loam Tirzah silty clay loam Wickham sandy clay loam	E3 F3	72 (7)	66 (20)	65(1)	-	Slight to severe	Slight to severe	Severe	Moderate	Severe	Pines and Upland Hardwoods
136-10	Iredell sandy loam Iredell fine sandy loam Iredell loam Iredell loam, shallow solum Orange silt loam White Store silt loam	A1, 2 B1, 2 C1, 2	65 (3)	55 (3)	-	-	Severe	Moderate to severe	Severe	Slight to moderate	Slight to moderate	Pines
136-11	Cataula clay loam Efland silty clay loam Enon clay loam Iredell clay loam Mecklenburg clay loam Orange silty clay Vance clay loam Worsham sandy clay loam	B3 C3 D3 E3 F3	70 (12)	55 (8)	-	-	Slight to moderate	Moderate to very severe	Severe	Severe	Severe	Pines
136-12	Cataula sandy loam Cataula fine sandy loam Enon sandy loam Enon loam Vance sandy loam	B1, 2 C1, 2 D1, 2 E1, 2 F1, 2	74 (28)	59 (12)	-	-	Severe	Slight to severe	Moderate to severe	Moderate	Slight to severe	Pines
136-13	Edgemont very stony sandy loam Goldston silt loam Louisa sandy loam Louisburg sandy loam Manteo silt loam Penn silt loam Wilkes sandy loam	B2 C2 D2 E2 F2	74 (17)	68 (14)	73 (2)	82 (4)	Severe	Moderate to severe	Moderate to severe	Moderate to severe	Moderate to severe	Pines
136-14	Appling very stony sandy loam Appling sandy loam, thick surface Appling sandy loam, shallow solum Buncombe loamy sand Durham loamy sand, thick surface Helena sandy loam, thick surface Louisburg sandy loam, deeply weathered Molena loamy sand	A1 B1 C1 D1 E1 F1	68 (6)	-	-	-	Severe	Slight	Slight to moderate	Slight	Slight to moderate	Pines
136-15	Efland silt loam Efland loam Mecklenburg loam Mecklenburg sandy loam	A1, 2 B1, 2 C1, 2 D1, 2	80 (8)	58 (2)	-	-	Severe	Slight	Slight	Slight	Slight to moderate	Pines
136-16	Colfax sandy loam Elbert silt loam Roanoke sandy loam Roanoke silt loam Worsham sandy loam Worsham silt loam	A1, 2 B1, 2 C1, 2 D1, 2	75 (1)	66 (7)	70 (1)	-	Severe	Moderate to severe	Severe	Slight to moderate	Slight	Pines and Lowland Hardwoods

Table 2 - Woodland Suitability Groupings of Soils with Interpretations for Management and Treatment Southern Piedmont of South Carolina (Major Land Resource Area 136)

GROUP NO.	SOIL MAPPING UNIT		POTENTIAL SOIL PRODUCTIVITY - SITE INDEX AT 50 YEARS 2/				INTERPRETATIONS FOR WOODLAND CONSERVATION 3/					SUITABLE WOODCROPS
	SOIL SERIES, TYPE, AND PHASE	SLOPE AND EROSION CLASSES 1/	LOBLOLLY PINE	SHORTLEAF PINE	LONGLEAF PINE	VIRGINIA PINE	PLANT COMPETITION	SEEDLING MORTALITY	EQUIPMENT LIMITATIONS	WINDTHROW HAZARD	EROSION HAZARD	
136-17	Gullied land, firm materials Gullied land, friable materials, 2 to 10% slopes Gullied land, friable materials, 10 to 35% slopes Stony land	Varied	Varied	Varied	Varied	Varied	Varied	Varied	Varied	Varied.	Varied	Varied

1/ Slope Classes:
A = 0 to 2 percent slopes, nearly level
B = 2 to 6 percent slopes, gently sloping
C = 6 to 10 percent slopes, sloping
D = 10 to 15 percent slopes, strongly sloping
E = 15 to 25 percent slopes, moderately steep
F = 25 percent slopes and over, steep

Erosion Classes:
1 = none to slight (up to 25 percent of surface soil removed)
2 = moderate (25 to 75 percent of surface soil removed)
3 = severe (75 percent or more of surface soil and up to 25 percent of subsoil removed)

2/ Average site index calculated from all available measurements on soils included in each group. Numbers in parentheses indicate the number of measurements. A dash in place of a site index value indicates that the species is generally not suited to the soils.

3/ See text for a definition of these items.

Equipment limitations are regarded as slight to moderate. The silt loam surface soils puddle and pack easily and concentration of livestock or operation of equipment during wet periods should be avoided. Seepage and occasional overflow interfere with the use and management of these soils. Drainage may be needed to facilitate operations and maintain roads in some places. Surface drainage is better on the 2 to 6 percent slopes than on the 0 to 2 percent slopes and equipment can be used with little restriction on the steeper slopes. On the nearly level soils, the use of equipment is restricted moderately after rains.

Windthrow and erosion are not serious hazards, but "Dieback" of hardwoods may occur during droughts.

Woodland Suitability Group No. 136-2

These are deep, nearly level, moderately well to well drained alluvial soils with fine sandy loam to silty loam surface soils and subsoils. They are subject to occasional overflow. Infiltration is slow, permeability is moderate. The moisture supplying capacity is high. Organic matter content and natural fertility are medium. Mapping units of the following soils are included:

Congaree sandy loam
Congaree fine sandy loam
Congaree silt loam
Local alluvial land, well drained
Mixed alluvial land, well drained
Starr loam
State fine sandy loam

Sweetgum, yellow-poplar, blackgum, ash, sycamore, cottonwood, black walnut, red maple, cherrybark oak, Shumard oak, white oak, cow oak, loblolly pine and slash pine are preferred species. Other suitable species include hackberry, beech, birch, American elm, winged elm, hickory, post oak, willow oak, persimmon, mulberry, dogwood, redcedar, and honeylocust.

These soils are suited to sawtimber and pulpwood rotations and to the production of high quality veneer and long poles and piling. Most of the species mentioned above are important wildlife food producers.

Average site indexes are: Loblolly pine 92; shortleaf pine 79; approximate average annual growth per acre (board feet, Scribner, or cubic feet) of well stocked unmanaged stands of 50 years is: loblolly pine 585 board feet or 129 cubic feet; shortleaf pine 490 board feet or 123 cubic feet.

Competition between species and by undergrowth vegetation of grasses, vines, and reeds, is severe, particularly with intolerant species. Intensive treatments such as land clearing, disking, furrowing, brush cutting, prescribed burning, or application of herbicides, are necessary to eliminate or control competing vegetation or to prepare sites for establishing seedlings. Where species preference is not important, and intensive site treatment or vegetation controls are not applied, the hazard of competition exists, but becomes unimportant. In these cases, the composition of forest stands develop toward the more tolerant species.

Restocking of fields or areas where competing vegetation is controlled, is generally satisfactory, assuming seed sources are adequate or that proper techniques are used when planting seed or seedlings. Mortality of planted seedlings is usually less than 25 percent. Periods of overflow are generally short in duration but regeneration of some species will be adversely affected by prolonged inundation and silting.

When wet, these fine textured soils will puddle and pack. Concentration of cattle, tillage, or use of equipment, should be avoided during wet periods to prevent damage to the soil structure and tree roots. Occasional overflows restrict access and use. Usually the season of restriction is less than three months during the year.

Erosion and windthrow are not significant hazards on these soils. During prolonged drought, sweetgum or other species may suffer "dieback".

Woodland Suitability Group No. 136-3

These are moderately deep, somewhat poorly to moderately well drained, fine sandy loam to silt loam soils that have silty clay loam to silt loam subsoils with friable to firm structure. They are on stream terraces and stream bottoms. Infiltration and permeability are moderate. Organic matter content and natural fertility are moderate and moisture supplying capacity is high. Mapping units of the following soils are included:

Augusta fine sandy loam
Augusta silt loam
Chewacla fine sandy loam
Chewacla silt loam

Sweetgum, blackgum, cherrybark oak, cow oak, Shumard oak, white oak, ash, loblolly pine, cypress, and red maple are preferred species. The following species are of secondary preference: willow oak, water oak, post oak, hackberry, American elm, winged elm, hickory, American beech, persimmon, and mulberry. Weed species include boxelder, bluebeech, hophornbeam, hawthorne, and live oak.

These soils are suited to sawtimber and pulpwood rotations, to the production of high quality veneer, and to medium and long length poles and piling. Most of the above species are primary wildlife food species. Average site indexes are: loblolly pine 110; shortleaf pine 88; and longleaf pine 73. Site indexes for commercial hardwoods have not been fully determined. Approximate average annual growth per acre (board feet, Scribner or cubic feet) of well stocked, unmanaged stands at 50 years of age is: loblolly pine 850 board feet or 168 cubic feet; shortleaf pine 620 board feet or 141 cubic feet; and longleaf pine 26 board feet or 85 cubic feet.

The natural vegetation composed primarily of hardwoods and ground cover, competes severely with pine species. Prescribed burning, applying herbicides, land clearing, disking, or other intensive treatment is necessary to control or eradicate competing vegetation and to prepare seedbeds before restocking to pine species. For the regeneration of specific hardwoods, the competition hazard may be severe, and intensive treatment may be needed. If no particular species is preferred, the hazard is slight to moderate. A mixed stand of hardwoods can be regenerated, but this may be delayed and growth may be retarded by competition.

Seedling mortality due to soil influence is classed slight to severe and varies by individual tree species. Overflow is hazardous to germination of seed and growth of seedlings of both conifers and hardwoods. Prolonged inundation and silting during early spring is particularly detrimental to recently germinated seedlings. Water management improves site quality and reduces mortality but frequently this practice is not feasible.

The use of equipment is restricted by overflow and poor drainage. Adequate drainage is needed for roads. The use of equipment and grazing should be avoided when these soils are wet to avoid compaction and damage to tree roots. Water management facilitates access and woodland operations but overflow and debris interfer with drainage and the efficient operation of water control structures.

Windthrow and erosion are not significant hazards on this soil. "Dieback" of hardwoods may be expected during drought.

A wide variety of species is suited to these soils. The production potential is excellent and justifies intensive treatment that includes the selection of species and improvement of sites. To attain the potential production indicated, it is necessary to recognize the specific requirements of these soils and plan for specific treatment needed for each species. Putnam, Furnival, and McKnight (28) list approximately 70 important commercial species of the southern bottomlands and describe important characteristics and site requirements for them.

Woodland Suitability Group No. 136-4

These are deep, very poorly drained silt loam soils of the stream floodplains. They are nearly level, with some depressional areas. Infiltration and permeability are slow. Moisture supplying capacity is high. Organic matter content and natural fertility are moderate. Mapping units of the following soils are included:

Mixed alluvial land, poorly drained
Wehadkee fine sandy loam
Wehadkee silt loam

Loblolly pine, sweetgum, ash, blackgum, tupelo gum, cypress, and red maple are preferred species. Persimmon, hickory, willow oak, water oak, hackberry, American elm, winged elm, and beech are species of intermediate preference.

These soils are suited to sawtimber and pulpwood rotations and to the production of high quality veneer and long poles and piling. Most of the species mentioned above are important as sources of wildlife food.

Average site index is: loblolly pine 102; shortleaf pine 77. Site indexes for commercial hardwood species have not been fully determined. Approximate average annual growth per acre (board feet, Scribner or cubic feet) of well stocked unmanaged stands at 50 years of age is: loblolly pine 728 board feet or 150 cubic feet; shortleaf pine 460 board feet or 119 cubic feet.

The natural vegetation, composed primarily of hardwoods and ground cover, competes severely with pine. Prescribed burning, applying chemicals, clearing sites, disking, or other intensive treatment is needed to control or eradicate competing vegetation and to prepare seedbeds for restocking to pine. For regeneration of specific hardwoods, the competition hazard may be severe and intensive treatment may be needed. If no particular species is preferred, the hazard is considered slight and a satisfactory stand of mixed hardwoods can be regenerated naturally.

Seedling mortality due to soil influence varies by individual tree species but overflow is generally hazardous to germination of seed and growth of all seedlings. It is, therefore, considered severe on this soil. Prolonged inundation and silting during the growing season cause severe mortality. Water management improves site quality and reduces mortality but frequently this practice is not feasible on these soils.

The use of equipment is restricted by overflow and poor drainage. Adequate drainage is needed for roads, but may not be practical on all areas. The use of equipment and grazing should be avoided when these soils are wet to avoid compaction and damage to tree roots.

Windthrow and erosion are not significant hazards on these soils.

A wide variety of species is suited to these soils. The production potential is excellent and justifies intensive treatment that includes the selection of species and improvement of sites. To attain the potential production indicated, it is necessary to recognize the requirements of the sites and the treatment needed for each species. Putnam, Furnival, and McKnight (28) list approximately 70 of important commercial species of the southern bottomlands and describe important characteristics and site requirements for them.

Woodland Suitability Group No. 136-5

These are deep to moderately deep, well to moderately well drained soils on nearly level to gently sloping landscapes. They have sandy loam to loam surface layers and friable to firm subsoils.

The degree of erosion on these soils ranges from slight to moderate. Infiltration and permeability are moderately rapid to moderately slow. Moisture supplying capacity

is medium to high. They are moderately high in natural fertility and contain a moderate amount of organic matter.

Slightly and moderately eroded phases with slopes of less than 6 percent of the following soil types are included:

Alamance silt loam
Appling sandy loam
Appling coarse sandy loam
Appling gravelly sandy loam
Bradley sandy loam
Cecil sandy loam
Cecil gravelly sandy loam
Chesterfield sandy loam
Davidson loam
Durham sandy loam
Georgeville silt loam
Herndon silt loam
Helena sandy loam
Helena coarse sandy loam
Hiwassee sandy loam
Lloyd sandy loam
Lloyd loam
Lockhart sandy loam
Masada fine sandy loam
Madison sandy loam
Madison gravelly sandy loam
Mayodan silt loam
Nason silt loam
Tatum silt loam
Tirzah silt loam
Wadesboro silt loam
Wickham sandy loam

Loblolly pine is a preferred species for sawlog and pulpwood rotations. In the lower Piedmont longleaf pine and slash pine are also preferred species. Shortleaf pine and Virginia pine are of secondary preference. Plantings of longleaf pine and slash pine have been successful on these soils. These soils are suited to the production of poles and piling of medium to long lengths. Among the broadleaf trees, yellow-poplar and black walnut are preferred but scarlet oak, northern red oak, black oak, white oak, and southern red oak, are also suited. Oaks, hickories, persimmon, and black-cherry are primary species producing wildlife food. Pines, redcedar, and ligustrums are suited for windbreaks where needed. Dogwood, redbud, holly, redcedar, sugar maple, basswood, oaks, hickories, and pines are some native species suited for urban uses on these soils.

Average site indexes are: loblolly pine 76 (except on moist sites where average is 94); shortleaf pine 65 (except on moist sites where average is 79); longleaf pine 55; and Virginia pine 73.

Approximate average annual growth per acre (board feet, Scribner or cubic feet) of well stocked, unmanaged stands at 50 years of age is: loblolly pine 378 board feet or 96 cubic feet; shortleaf pine 285 board feet or 95 cubic feet; longleaf pine 73 board feet or 45 cubic feet; and Virginia pine 357 board feet or 108 cubic feet.

Expected plant competition is severe. Upland hardwoods, when present, compete severely with pines or with hardwoods selected for management. Intensive treatments such as application of herbicides, land clearing, disking, undercutting root systems, brush cutting or prescribed burning are frequently necessary to eliminate or control competing vegetation or to prepare sites prior to establishing desired seedlings.

Seedling mortality on these soils is slight. A survival of 75 percent or more of planted seedlings is normally expected. Stands from natural seeding during normal years become well stocked when seed sources of desired species are adequate.

Equipment limitations are moderate on the soils which have silt loam surfaces and which are on slopes of 2 to 6 percent. The hazard is slight on other soils in this group.

Trees are not normally subject to windthrow on these soils.

Erosion hazard is considered slight except for silt loams on slopes of 2 to 6 percent where the hazard is moderate. Discretion should be used in the location of roads and firebreaks or tillage and other operations which destroy protective cover, or promote concentration of water.

SC-1815-7

Severe plant competition on Alamance silt loam, 2 to 6 percent slopes

SC-289-9

Seedling mortality is slight on Appling sandy loam, 0 to 2 percent slopes and well stocked stands can be expected when adequate seed sources are present.

Littleleaf disease of loblolly and shortleaf pines may occur on these soils but usually is of no serious consequence due to depth of soil and rooting zones. Effects are expected to be more severe in areas of Class 2 erosion occurring on Davidson loam, Lloyd loam, and Lloyd sandy loam soils.

Woodland Suitability Group No. 136-6

These are deep to moderately deep, well drained soils on sloping to strongly sloping landscapes. They have sandy loam to loam surface layers and friable to firm subsoils. The degree of erosion on these soils ranges from slight to moderate. Infiltration and permeability are moderately rapid to moderately slow. Moisture supplying capacity is high. The soils are moderately high in natural fertility and contain a moderate amount of organic matter.

Slightly to moderately eroded phases of the following soils with slopes ranging from 6 to 15 percent are in this group:

Alamance silt loam
Appling sandy loam
Appling coarse sandy loam
Appling gravelly sandy loam
Bradley sandy loam
Cecil sandy loam
Cecil sandy gravelly loam
Chesterfield sandy loam
Davidson loam
Durham sandy loam
Georgeville silt loam
Herndon silt loam
Helena sandy loam
Helena coarse sandy loam
Hiwassee sandy loam
Lloyd sandy loam
Lloyd loam
Lockhart sandy loam
Madison sandy loam
Madison gravelly sandy loam
Masada fine sandy loam
Mayodan silt loam
Nason silt loam
Tatum silt loam
Tirzah silt loam
Wadesboro silt loam
Wickham sandy loam

Loblolly pine is a preferred species for sawlog and pulpwood rotations. In the lower Piedmont, longleaf pine and slash pine are also preferred species as plantations have been successful on many of the soils. Shortleaf pine and Virginia pine are of secondary preference. These soils are suited to the production of poles and piling of medium to long length. Yellow-poplar, sweetgum, upland oaks, and black walnut are preferred broadleaf species especially on the more favorable moist slopes. Oaks, hickories, persimmons, blackcherry, beech, black walnut, honeylocust, and numerous shrubs are important wildlife food producing species. Pine, redcedar, Arizona cypress, and ligustrum, are important windbreak species, where needed. Dogwood, redbud, holly, redcedar, black walnut, beech, black locust, pecan, elms, red maple, sugar maple, basswood, oaks, hickories, pines, magnolia, and yellow-poplar are suited to urban uses on these soils.

Average site indexes are: loblolly pine 75 (except on moist sites where site index is 96); shortleaf pine 64 (except on moist sites where site index is 84); longleaf pine 64; and Virginia pine 73.

Approximate average annual growth per acre (board feet, Scribner or cubic feet) of well stocked unmanaged stands at 50 years of age is loblolly pine 365 board feet (Scribner) or 94 cubic feet; shortleaf pine 270 board feet (Scribner) or 93 cubic feet; longleaf pine 200 board feet or 65 cubic feet; and Virginia pine 357 board feet or 108 cubic feet.

Plant competition is severe on these soils. Undesired vegetation competes severely with pine or intolerant hardwoods selected for management. Intensive treatments such as applying herbicides, land clearing, disking, brush cutting, prescribed burning, or combinations of these methods are frequently necessary to eliminate or control competing vegetation or to prepare sites prior to establishing seedlings.

Woodland Suitability Group No. 136-7

These are moderately deep, to deep, well drained soils on steep slopes. They have sandy loam to loam surface layers and friable to firm subsoils. The degree of erosion on these soils ranges from slight to moderate. Infiltration and permeability are moderately rapid to moderately slow. Moisture supplying capacity is medium to high. These soils are moderately high in natural fertility and contain a moderate to low amount of organic matter.

Slightly and moderately eroded phases of the following soils having slopes greater than 15 percent are included:

Alamance silt loam
Appling sandy loam
Appling gravelly sandy loam
Bradley sandy loam
Cecil sandy loam
Cecil gravelly sandy loam
Chesterfield sandy loam
Davidson loam
Durham sandy loam
Georgeville silt loam
Herndon silt loam
Hiwassee sandy loam
Helena sandy loam
Helena coarse sandy loam
Lloyd loam
Lloyd sandy loam
Lockhart sandy loam
Madison sandy loam
Madison gravelly sandy loam
Mayodan silt loam
Nason silt loam
Tatum silt loam
Tirzah silt loam
Wadesboro silt loam
Wickham sandy loam

Loblolly pine is a preferred species on these soils for sawlog and pulpwood rotations. Shortleaf pine and Virginia pine are also suitable but of secondary preference as is slash that has been successfully planted on some of the soils. In the lower Piedmont, longleaf pine and slash pine are preferred species along with loblolly.

These soils are suited to the production of poles and piling of medium to long lengths.

Yellow-poplar, sweetgum, black walnut, blackcherry, and upland oaks are broadleaf species, preferred for sawtimber, veneer or furniture stock. Oaks, hickories, beech, blackcherry, black walnut, and persimmon are primary wildlife food species. Pines, redcedar, Arizona cypress, and ligustrum are suited for windbreaks where needed. Dogwood, redbud, holly, redcedar, black walnut, pecan, elms, yellow-poplar, red maple, sugar maple, basswood, oaks, hickories, magnolia and pines are suited for urban uses.

Average site indexes are: loblolly pine 83 (on dry ridgetops average site index is 65); shortleaf pine 65. Approximate average annual growth per acre (board feet, Scribner or cubic feet) of well stocked unmanaged stands at 50 years of age is: loblolly pine 466 board feet or 109 cubic feet; and shortleaf pine 285 board feet or 95 cubic feet; information is not available for the other preferred species or for others of secondary preference.

Upland hardwoods and shrubs compete severely with pines and the more desirable intolerant hardwoods. Intensive treatments such as application of herbicides, girdling, brush cutting, or combinations of these treatments are frequently necessary to eliminate or control competing vegetation or to prepare sites prior to establishing pine seedlings or in getting adequate regeneration of other species. Steep slopes limit the type and application of treatments on these soils.

Seedling mortality is considered slight, and well stocked stands are expected from plantings or natural regeneration when adequate seed sources are present and competing vegetation is controlled.

Steep slopes, gravel, boulders, dikes of quartz and the hazard of erosion severely restrict access and the operation of equipment.

The hazard of erosion is severe. Construction of roads, firebreaks, and other operations which disturb the protective ground cover should be avoided. Damage to soils and trees from overgrazing is severe on these soils.

Windfall is no special problem.

Woodland Suitability Group No. 136-8

These are moderately deep to deep, well drained soils on landscapes that are gently sloping to strongly sloping. They have sandy clay loam to clay loam surface layers and friable to firm clayey subsoils. These soils have been severely eroded. Infiltration is slow and permeability is moderately rapid to moderately slow. Moisture supplying capacity is medium to high. The soils are moderately low in natural fertility and contain a low amount of organic matter.

Severely eroded phases of the following soils, having slopes of less than 15 percent, are included in this group:

Alamance silty clay loam
Appling sandy clay loam
Bradley sandy clay loam
Cecil clay loam
Chesterfield sandy clay loam
Davidson clay loam
Durham sandy clay loam
Georgeville silty clay loam
Herndon silty clay loam
Helena sandy clay loam
Hiwassee clay loam
Lloyd clay loam
Lockhart clay loam
Madison clay loam
Nason silty clay loam
Tatum silty clay loam
Tirzah silty clay loam
Wadesboro silty clay loam
Wickham sandy clay loam

Where subsoils are firm, Virginia pine is a preferred species; "dieout" of loblolly pine may occur and on other soil conditions loblolly pine is a preferred species. In the lower Piedmont, longleaf pine and slash pine also are preferred species on the sandy clay loams. Shortleaf pine is not well suited to these soils because of the hazard of littleleaf disease on severely eroded soils, especially where the subsoil is firm.

On soils with friable subsoil, both sawtimber and pulpwood rotations may be considered. These soils will produce poles and piling of medium length. On the other soils, with firm subsoils, pulpwood or small sawlog size rotations should be considered because production potentials are limited. These soils will produce posts and poles of short lengths.

On deep, friable soils, yellow-poplar, sweetgum, black walnut, blackcherry, and upland oaks are broadleaf species preferred for sawtimber, veneer, or furniture stock; oaks, hickories, beech, black walnut, blackcherry, and persimmon are important wildlife food species. Where soil solum is shallow, broadleaf species are not well suited. Pines, redcedar, Arizona cypress, and ligustrum are suited for windbreaks on deep friable soils.

Average site indexes are: loblolly pine 73 (on moist sites, with friable subsoil average site index is 91, on dry sites with firm subsoil average site index is 60 or below); shortleaf pine 63 (on moist sites with friable subsoil average site index is estimated to be approximately 70, on dry sites with firm subsoil, average site index is estimated to be 50 or below); longleaf pine 70; and Virginia pine 66.

Approximate average annual growth per acre (board feet, Scribner or cubic feet) of well stocked unmanaged stands at 50 years of age is: loblolly pine 340 board feet or 91 cubic feet; shortleaf pine 250 board feet or 91 cubic feet; longleaf pine 230 board feet or 78 cubic feet; and Virginia pine 280 board feet or 98 cubic feet.

Competition of undesired species with pines is slight on dry slopes and where subsoil is firm because these sites are unfavorable to broadleaf species. Where the subsoil is friable and slopes are moist, the hazard of competition varies from moderate to severe. Intensive treatments such as applying herbicides, girdling, brush cutting,

or combinations of these methods, are necessary to eliminate or control competing vegetation or to prepare sites prior to establishing seedlings.

On phases having deep root zones and on A and B slopes (0 - 6%), mortality of seedlings is slight. Even on "dieout" areas on A and B slopes (0 - 6%), an abundance of regeneration may be present. Mortality of seedlings is severe on dry slopes where runoff is rapid and root zones are restricted by firm subsoil, boulders, or dikes of rock at or near the surface. Expected losses exceed 50 percent of planted stock. Natural regeneration cannot be relied on to establish well stocked stands. Establishment of live vegetation, fertilizing, mulching, construction of brush dams or other intensive site preparation may be necessary prior to attempting to plant seedlings to control erosion.

Equipment limitations vary from slight on deep friable soils to severe on strong slopes, where subsoil is firm, and where soil solum is shallow due to erosion, boulders, or dikes of quartz. Where the subsoil is sticky when wet and hard when dry, equipment cannot be used and livestock cannot be concentrated without severe damage to tree roots and the soil.

Windfall is severe where the solum is shallow and slight where soil is deep and friable.

Erosion is a severe hazard, especially where solum is shallow. Construction of firebreaks, roads or other operations which disturb protective ground cover should be avoided insofar as possible. All necessary construction should follow the contour if practical.

Woodland Suitability Group No. 136-9

These are severely eroded moderately deep to shallow, well drained soils on steep and very steep slopes. They have sandy clay loam to clay loam surface layers and friable to firm clayey subsoils. These soils have been severely eroded. Infiltration is slow and permeability is moderately rapid to moderately slow. Moisture supplying capacity is medium to high. The soils are moderately low in natural fertility and contain a low amount of organic matter.

The soils included are:

Alamance silty clay loam
Appling sandy clay loam
Bradley sandy clay loam
Cecil clay loam
Chesterfield sandy clay loam
Davidson clay loam
Durham sandy clay loam
Georgeville silty clay loam
Herndon silty clay loam
Hiwassee clay loam
Lloyd clay loam
Lockhart clay loam
Louisa clay loam
Madison clay loam
Nason silty clay loam
Tatum silty clay loam
Tirzah silty clay loam
Wickham sandy clay loam

Loblolly pine is a preferred species except on shallow dry slopes where Virginia pine is a preferred species. Littleleaf disease on shortleaf pine and "dieout" of loblolly pine are severe on these adverse sites. Longleaf pine and slash pine also are suited on some of these soils in the lower Piedmont. The moderately deep friable soils are suited to sawtimber and will produce poles and piling of medium to long lengths. The shallow soils are suited to pulpwood or small sawlog size rotations only and will produce posts and poles of short lengths. Local areas may be unsuited for commercial forest crops and erosion control will be the primary objectives of woodland management. On moderately deep phases and on shallow phases where the subsoil is friable, loblolly pine, yellow-poplar, sweetgum, black walnut, and upland oaks are preferred species for sawtimber, pulpwood, veneer, or furniture stock. These sites will produce poles and piling of medium lengths. On moist sites poles and piling attain long lenths.

On the shallow soils where subsoil is firm, Virginia pine is a preferred species. Littleleaf disease on shortleaf pine and "dieout" on loblolly pine are very severe on these soils when aeration of the subsoil is poor.

Oaks, hickories, blackcherry, persimmon, beech, and black walnut are primary wildlife food species on sites where root zones are not restricted severely and moisture is favorable. On these sites dogwood, redbud, redcedar, black locust, beech, black walnut, pecan, elms, yellow-poplar, red maple, sugar maple, oaks, hickories, and pines are suited for urban uses.

Average site indexes are: loblolly pine 72 (on moist slopes 90, and on shallow solum productivity is decreased, in areas affected by "dieout" site index is below 40); shortleaf pine 66 (where littleleaf is prevalent, site index is below 40); and longleaf pine is 65.

Approximate average annual growth per acre (board feet, Scribner or cubic feet) of well stocked unmanaged stands at 50 years of age is: loblolly pine 390 board feet or 89 cubic feet; shortleaf pine 300 board feet or 97 cubic feet; and longleaf pine 170 board feet or 67 cubic feet.

The hazard of plant competition varies from slight to severe. Dry shallow phases with firm subsoil are generally unfavorable to hardwoods and competition is slight. Moderately deep phases are more favorable sites and the hazard is moderate, necessitating control practices. On moist slopes the moderately deep phases have higher productivity and plant competition is severe.

On moderately deep phases and moist slopes, intensive treatments, such as applying herbicides, girdling, brush cutting, or combinations of methods, are necessary to eliminate or control competing vegetation or to prepare sites prior to establishing seedlings.

Mortality of seedlings is slight to moderate and some replanting may be necessary. On dry sites and on shallow phases with firm subsoils, seedling mortality is expected to exceed 50 percent of planted seedlings because of rapid runoff, unfavorable moisture, and poor aeration. Establishment of live vegetation, mulching, fertilizing, construction of brush dams, or other intensive site preparation may be necessary to control erosion and prepare sites prior to planting seedlings. Natural regeneration cannot be relied upon.

Equipment limitations are considered severe on soils of this group due to steep slopes and past erosion. Special care is suggested in laying out, constructing, and maintaining roads, skid trails, firebreaks, landings, etc., and in operating equipment to minimize further soil deterioration due to erosion. Rooting zones are generally shallow due to firm subsoils, boulders or dikes of quartz. This fact makes the roots liable to damage from equipment use and erosion. Concentrations of livestock also aggravate soil and root damage by trampling.

Potential soil erosion is a severe hazard due to steep slopes, existing runoff patterns from past erosion and because of rapid runoff caused both by steep slopes and the nature of the soils. Special attention in management is suggested to assure adequate protective ground cover.

Windfall varies from moderate on moderately deep phases to severe on shallow phases where root development is restricted. Salvage cuttings may sometimes be needed where the hazard is rated severe.

Woodland Suitability Group No. 136-10

These are moderately deep to shallow, moderately well drained soils with sandy loam to silt loam surface layers and very plastic clay to silty clay subsoils. Natural fertility and organic matter are low. Infiltration rate is moderate and permeability is very slow. Internal drainage is very slow. Moisture supplying capacity is low.

Mapping units of the following soil types are in this group:

Iredell sandy loam
Iredell fine sandy loam
Iredell loam
Iredell loam, shallow
Orange silt loam
White Store silt loam

Loblolly pine is a preferred species. Small sawtimber and pulpwood rotations are suitable as is the production of posts, poles, and piling of short lengths. Eastern redcedar is a preferred species for posts and Christmas trees. Loblolly pine and redcedar are preferred for windbreaks where needed. Shortleaf pine is of secondary preference because on these soils shortleaf pine is susceptible to severe losses from littleleaf disease. Oaks and hickories are primary wildlife food species but production potential of these as woodcrops is limited. Oaks, hickories, pine, redcedar, sweetgum, dogwood, redbud, holly, and elms are native species suited for urban uses.

Average site indexes are: loblolly pine 65, shortleaf pine 55.

Approximate average annual growth per acre (board feet, Scribner or cubic feet) of well stocked unmanaged stands at 50 years of age is: loblolly pine 230 board feet or 78 cubic feet; shortleaf pine 145 board feet or 76 cubic feet.

When pine is the desired woodcrop, competition from upland hardwood and ground cover vegetation for limited moisture supplied is severe. Prescribed burning, applying herbicides, clearing, disking, or other intensive treatment is necessary to eliminate or control competing vegetation or to prepare sites prior to establishing seedlings.

Mortality of seedlings varies from moderate to severe due to climatic fluctuation and some differences among and within the group of soils. Natural regeneration alone cannot be relied upon for well stocked stands of desired pine species. Moderate infiltration, very slow permeability, very plastic subsoils, and shallow sola restrict moisture supplying capacity, aeration, and root development.

Therefore, the use of equipment is severely restricted by poor internal drainage and other characteristics of the soils such as texture and plasticity of subsoils and shallow sola.

Windthrow hazard varies from slight to moderate except on Iredell loam, shallow where the hazard is severe.

Hazard of erosion is moderate on 6 to 10 percent slopes.

Woodland Suitability Group No. 136-11

These are severely eroded, moderately well to well drained soils of the uplands with clayey surface layers and firm to very firm plastic clay subsoils. Infiltration is slow and permeability is moderately slow to slow. Moisture supplying capacity is low.

Mapping units of the following soil types are in this group.

Cataula clay loam
Efland silty clay loam
Enon clay loam
Iredell clay loam
Mecklenburg clay loam
Orange silty clay
Vance clay loam
Worsham sandy clay loam

Loblolly pine, Virginia pine and redcedar are preferred species for watershed and erosion control use for small sawtimber and for pulpwood rotations. Oaks, hickories, pines, redcedar, and elm are native species suitable for wildlife food and urban uses of these soils. These soils are low in productivity and have many hazards and limitations in woodland uses. Therefore, erosion control and soil protection usually are primary objectives of management on them.

SC-1860-10

Severe mortality of shortleaf pine infested with Littleleaf disease on Enon clay loam, 10 - 15 percent slopes, severely eroded.

SC-1815-10

"Dieout" of loblolly pine on Enon clay loam, 2 - 6 percent slopes, severely eroded.

On the poorer sites, littleleaf disease is very severe on shortleaf pine and "dieout" is severe on loblolly pine.

On the more favorable conditions of these soils, average site indexes are: loblolly pine 70; and shortleaf pine 55; but this does not represent a true average for the group as a whole. Unrecorded information indicates that a much wider range in site index is more representative for the severely eroded group of soils. Site indexes for loblolly pine of less than 40 have been found. Currently, therefore, no productivity information can be supplied with assurance.

Plant competition affecting pine species is moderate on the more favorable sites and slight on the less favorable sites. These soils are generally more favorable for pines than broadleaf species. Redcedar sometimes competes with pines on the more favorable soils.

Mortality of seedlings ranges from moderate to very severe, depending locally upon the consistence of the subsoil and depth of solum. Where erosion is most severe site treatments such as fertilization, live vegetative dams, brush dams, mulching, ripping or other intensive site preparation is needed to establish seedlings. Frequently the cost of treatment exceeds expected returns from woodcrops. Natural regeneration cannot be relied upon to provide adequate and immediate restocking of denuded or cut-over areas.

Access to areas, operation of equipment, and even grazing by livestock need to be severely restricted on these soils because of severe erosion, slope, consistence of subsoil and thin sola.

Potential accelerated erosion is a severe hazard because runoff is rapid.

Windfall may be severe due to the shallow rooting zones.

Woodland Suitability Group No. 136-12

These are moderately deep to deep, moderately well drained soils of the uplands with loam to sandy loam surface layers and very firm to tough clay subsoils. Enon soils are an exception in that they have plastic subsoils. Infiltration is moderate and permeability is low. Moisture supplying capacity is low. Slightly and moderately eroded phases of the following soil types are in this group.

Cataula sandy loam
Cataula fine sandy loam
Enon sandy loam
Enon loam
Vance sandy loam

Loblolly pine is a preferred species for sawtimber and pulpwood rotations. Shortleaf pine and Virginia pine are of secondary preference. These soils will produce short and medium length poles and piling. Pines, oaks, and hickories are primary wildlife food species. Pines and redcedar are species preferred for windbreaks.

Average site indexes are: loblolly pine 74; shortleaf pine 59.

Approximate average annual growth per acre (board feet, Scribner or cubic feet) of well stocked, unmanaged stands at 50 years of age is: loblolly pine 350 board feet or 93 cubic feet; shortleaf pine 195 board feet or 84 cubic feet.

Competition for preferred pine species from upland hardwood is moderate on moderately deep phases and severe on deep phases.

Moderate to severe seedling mortality of planted stock is expected from planted pines on moderately deep phases with firm, tough, or plastic subsoil and usually some replanting is necessary for adequate stocking. On other phases the hazard is slight and well stocked stands are expected from initial plantings or from natural seeding.

Access to areas, grazing, and operation of equipment are severely limited on the moderately eroded, gently sloping phases due to firm, tough, or plastic subsoils and shallow surface soils. On other phases the restrictions of equipment limitations are considered moderate.

Erosion hazard is moderate to severe on slopes of 6 percent or more and on moderately eroded phases. On other phases, the hazard is slight.

Windthrow hazard is rated moderate on moderately deep phases.

Littleleaf disease of shortleaf pine and "dieout" of loblolly pine are more severe on moderately deep to shallow phases than on the deep phases of these soils.

Woodland Suitability Group No. 136-13

These are shallow to very shallow, well to excessively drained soils with sandy loam to silt loam surface layers and thin or discontinuous clay subsoils. Infiltration is moderate and permeability is rapid to excessive. Moisture supplying capacity is low.

Mapping units of the following soil types are in this group:

Edgemont very stony sandy loam
Goldston silt loam
Louisa sandy loam
Louisburg sandy loam
Manteo silt loam
Penn silt loam
Wilkes sandy loam

Where hard rock is close to the surface some of these soils are not suited to the production of commercial wood crops because potentials (due to shallow root zone and excessive drainage) do not justify inputs. On these sites erosion control is a primary objective of woodland management which justifies intensive techniques and treatments. Field inspections and on-site determinations are desirable before undertaking intensive management on very shallow soils where bedrock is close to the surface, where slopes are steep, or moisture supply is limited. Where root zones and moisture supply are more favorable, commercial wood crops can be grown.

Loblolly and Virginia pine are the preferred species. Longleaf, shortleaf, and slash pines are suited in the more favorable locations. Although considerable variation in potential productivity exists among and within soils of this group, they are generally suited to commercial poles and piling of short to medium lengths. Many severe hazards and limitations are associated with their use as woodland. These are summarized in Table 2 and discussed below. Pines and redcedar are preferred for windbreaks.

Average site indexes on suited sites are: loblolly pine 74 (on moist sites, site index is 82, on most adverse sites subject to "dieout" or littleleaf disease site index is less than 40); shortleaf pine 68 (on very shallow and adverse sites, site index is less than 40.); longleaf pine 73; and Virginia pine 82.

Approximate average annual growth per acre (board feet, Scribner or cubic feet) of well stocked unmanaged stands is: loblolly pine 350 board feet or 93 cubic feet; shortleaf pine 330 board feet or 101 cubic feet; longleaf pine 260 board feet or 85 cubic feet; Virginia pine 450 board feet or 117 cubic feet.

These soils are droughty, and many undesirable species compete severely with pine. Applying chemicals, girdling, planting, or other intensive treatment is needed to control competing vegetation. Shallow surfaces and/or plastic subsoils limit the use of equipment on these soils. Operation of equipment, particularly in wet weather may seriously damage tree roots and break down the soil structure. On the stronger slopes and on very stony sites, use of equipment is severely restricted and there is a severe erosion hazard. On slopes of less than 10 percent, the use of equipment is moderately restricted and the erosion hazard is moderate.

SC-1821-6

Boulders and rock outcrops which occur in some areas of Louisburg soils severely limit the use of equipment.

SC-1821-9

Windthrow of longleaf pine on Goldston silt loam, 2 - 6 percent slopes, a soil shallow to hard rock.

Where the moisture supplying capacity is low, the mortality of seedlings on slopes of less than 10 percent is moderate to severe. On slopes of more than 10 percent, seedling mortality is severe and intensive treatment is needed to adequately restock preferred species. Natural regeneration cannot be relied on.

Root development may be restricted by underlying bedrock, and droughty nature of these soils. Windfall is very severe where solum is very shallow.

Woodland Suitability Group No. 136-14

These are well drained to excessively drained soils with coarse textured or thick sandy surface layers (18 to 30 inches) and clayey subsoils which permit a moderate movement of water in the soil profile. Louisburg sandy loam, deeply weathered is an exception in that it has a very thin or discontinuous subsoil and the parent rock has been deeply weathered. Buncombe loamy sand has loamy sand to sand subsoils. Appling sandy loam, shallow solum has a thin subsoil. Moisture supplying capacity is medium to low.

Mapping units of the following soil types are included in this group:

Appling very stony sandy loam	Durham loamy sand, thick surface
Appling sandy loam, thick surface	Helena sandy loam, thick surface
Appling sandy loam, shallow solum	Louisburg sandy loam, deeply weathered
Buncombe loamy sand	Molena loamy sand

Loblolly pine, slash pine, and longleaf pine are preferred species for sawtimber and pulpwood rotations. Shortleaf pine is also suited. These soils will produce poles and piling of short to medium lengths. Oaks and hickories are primary wildlife food species. Pines and redcedar are suited for windbreaks.

Average site index is: loblolly pine 68.

Approximate average annual growth per acre (board feet, Scribner or cubic feet) of well stocked, unmanaged stands at 50 years of age is: loblolly pine 270 board feet or 83 cubic feet.

Undesirable species compete severely with preferred pines. Intensive treatments such as applying herbicides, girdling, brush cutting, clearing or combinations of methods may be necessary to eliminate or control competing vegetation or to prepare sites prior to establishing seedlings.

Expected seedling mortality due to soil influences is considered slight. Restocking of abandoned fields, open areas, or obtaining regeneration in openings, where plant competition is controlled or eliminated, is satisfactory, assuming seed sources are adequate for natural regeneration or that proper techniques are used when planting seed or trees. Light seedbed preparation may be beneficial but is not essential. Mortality of seedlings is slight. Limitations in the use of equipment are slight on slopes less than 10 percent and moderate on slopes of 10 percent or more, or where stones are so numerous as to interfere with the use of certain tools and equipment.

The hazard of erosion is slight except on slopes of 10 percent or more where the hazard is moderate and construction of roads and firebreaks should follow the contour if possible; other construction and operations which destroy protective ground cover should be avoided insofar as possible.

Windthrow is no special problem.

Woodland Suitability Group No. 136-15

These are deep, well drained soils with loam to sandy loam surface layers and very firm, slightly plastic clay subsoils. Infiltration is moderately slow and permeability is slow. Moisture supplying capacity is medium.

Mapping units of the following soil types are in this group:

Efland silt loam
Efland loam
Mecklenburg loam
Mecklenburg sandy loam

Loblolly pine is the preferred species for sawlog and pulpwood rotations. Shortleaf pine, slash pine, and Virginia pine, and redcedar are suited species. These soils will produce poles and piling of short and medium lengths. Oaks and hickories are primary wildlife food species.

Average site indexes are: loblolly pine 80; shortleaf pine 58. Approximate average annual growth per acre (board feet, Scribner or cubic feet) of well stocked, unmanaged stands at 50 years of age is: loblolly pine 425 board feet or 104 cubic feet; shortleaf pine 180 board feet or 82 cubic feet.

Plant competition is very severe on these soils. Application of chemicals, girdling, site preparation or other practices are necessary to control competing vegetation. Cost of intensive treatments in areas where the site index is low may exceed expected returns.

Mortality of seedlings is slight and expected survival of planted seedlings exceeds 75 percent. During years of normal climatic conditions adequate well stocked natural stands can be expected, assuming adequate seed sources are present and site preparation is accomplished.

Limitations in the use of equipment are slight. The hazard of erosion is slight on slopes of less than 10 percent. On slopes of 10 percent and more the erosion hazard is moderate and construction of roads and firebreaks should follow the contour. Other operations which destroy protective ground cover should be avoided insofar as possible.

Windthrow is no special problem.

Littleleaf disease and "dieout" occur on these soils but are not as severe as on severely eroded phases.

Woodland Suitability Group No. 136-16

These are deep to moderately deep, poorly drained soils with sandy loam to loam surface layers and plastic silty clay to firm clay subsoils. They are on low stream terraces, at heads of streams, and the bases of slopes. Infiltration is moderate and permeability is slow. Moisture supplying capacity is medium to high. Organic matter content and natural fertility are low.

Mapping units of the following soil types are in this group:

Colfax sandy loam
Elbert silt loam
Roanoke sandy loam
Roanoke silt loam
Worsham sandy loam
Worsham silt loam

Loblolly pine is a preferred species and slash pine is a suited species where surface drainage is adequate. Sweetgum, blackgum, and other moisture tolerant lowland hardwoods are preferred where surface drainage is inadequate for pine species. These soils have moderate production potential for sawtimber and pulpwood rotations and can produce poles and piling of medium to long lengths. Most of the preferred species are primary wildlife food producing species.

Average site indexes are: loblolly pine 75; shortleaf pine 66; longleaf pine 70; lowland hardwoods not determined.

Approximate average annual growth per acre (board feet, Scribner or cubic feet) on well stocked, unmanaged stands at 50 years of age is: loblolly pine 365 board feet

SC-1823-12

Excellent loblolly pine growing on Roanoke silt loam, a soil having high site index and production potential.

or 94 cubic feet; shortleaf pine 300 board feet, or 97 cubic feet; longleaf pine 230 board feet or 78 cubic feet.

In areas that have been in forest for long periods, hardwoods and ground cover compete severely with pine. Poor internal drainage stimulates competition by sweetgum, blackgum, and other moisture tolerant species. Prescribed burning, applying chemicals, clearing, disking, or other intensive treatment is needed to eliminate competing vegetation and to prepare seedbeds for more desirable species. Abandoned fields can be planted or restocked successfully before severe competition develops. To maintain well stocked pine stands for several successive rotations, the natural plant succession must be disrupted periodically.

Because the subsoil is sticky or plastic when wet and hard when dry, the use of equipment should be severely restricted for long periods after rains or in periods of drought. Roads need to be adequately drained. Controlled drainage will facilitate the use of equipment.

Seedling mortality is likely to be high because of the swelling and shrinking of the soils and adverse moisture conditions. Seedling mortality is moderate to severe. Interplanting may be necessary to obtain well stocked stands.

Gullied land, firm material SC-1195-9

In the Colfax soil, root development is restricted by the plastic subsoil. Trees that are released on all sides may be in danger of windthrow in periods of highest normal wind velocity. Thinning and other cutting operations can be accomplished without danger of windthrow.

There is no serious erosion hazard except on the Worsham soils on steep slopes.

Woodland Suitability Group No. 136-17

This group consists of miscellaneous land types. These vary in combined thickness of the surface layer and subsoil solum, and in permeability and infiltration rate. They are low in organic matter and fertility and moisture supplying capacity is variable. This group consists of:

Gullied land, firm material
Gullied land, friable materials, 2 to 10 percent slopes
Gullied land, friable materials, 10 to 35 percent slopes
Stony land

Merchantable trees may grow in areas between gullies where surface soil remains, but the site index of these mapping units is generally low. Sawtimber cannot be produced profitably. Plant competition may be slight where erosion is active. In areas where soil is stabilized and plant succession occurs, competition for the limited moisture supply is very severe. The use of equipment is severely restricted by gullies and by firm subsoil. Seedling mortality is in excess of 50 percent because the moisture content is poor. Mulching and other practices to prepare sites are necessary to establish adequate stands. The hazard of continued erosion is severe, and a ground cover should be established as quickly as possible. Protective cover should be maintained without disturbance.

Rock outcrops are not suited to commercial trees, and Stony land varies in its suitability. Sites should be examined carefully before attempts are made to establish trees on these mapping units.

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GLOSSARY

Alluvial soils. Soils developing from transported and fairly recently deposited material (alluvium) with little or no modification of the original materials by soil-forming processes.

Alluvium. Soil materials, as sand, silt, or clay, deposited on land by streams.

Consistence, soil. The combination of properties of soil material that determines its resistance to crushing and its ability to be molded or changed in shape. Consistence depends mainly on the forces of attraction between soil particles.

Horizon, soil. A layer of the soil, approximately parallel to the soil surface with distinct characteristics produced by soil-forming processes.

Infiltration. The entrance of water into surface horizons or sola.

Internal drainage. The movement of water through the soil profile. The rate is affected by the texture of the surface soil and subsoil and by the height of the water table, either permanent or perched.

Major land resource area. A broad geographic area with more-or-less homogeneous climate, similar soil pattern and type of agriculture, within which simple and direct correlations and interpretations can be made.

Moisture supplying capacity. The capacity of the soil to take in and supply moisture in amounts favorable to trees. It is determined chiefly by available water capacity (the difference between the amount of water in a soil at field capacity and at permanent wilting point), effective root depth, moisture extracting pattern, and depth to water table during the growing season. Runoff and infiltration are also important determinants but vary greatly with the condition of the surface (texture, cover, and shape of slope).

Permeability. The quality of a soil horizon that enables water or air to move through it.

Site index. Total height attained by the average dominant and codominant trees in a 50-year-old stand.

Soil fertility. The quality that enables the soil to provide the proper compounds, in the proper amounts and in the proper balance, for the growth of specified plants, when other factors, such as light, temperature, moisture, and the physical condition of the soil, are favorable.

Soil phase. A subdivision of the soil type covering variations in such things as relief, stoniness, and erosion, things that are significant to use and management.

Soil profile. A vertical section of the soil from the surface into the parent material.

Soil mapping unit. A soil mapping unit is the smallest delineation shown on the soil map. It is identified by soil series, types, and phases, including slope and erosion classes.

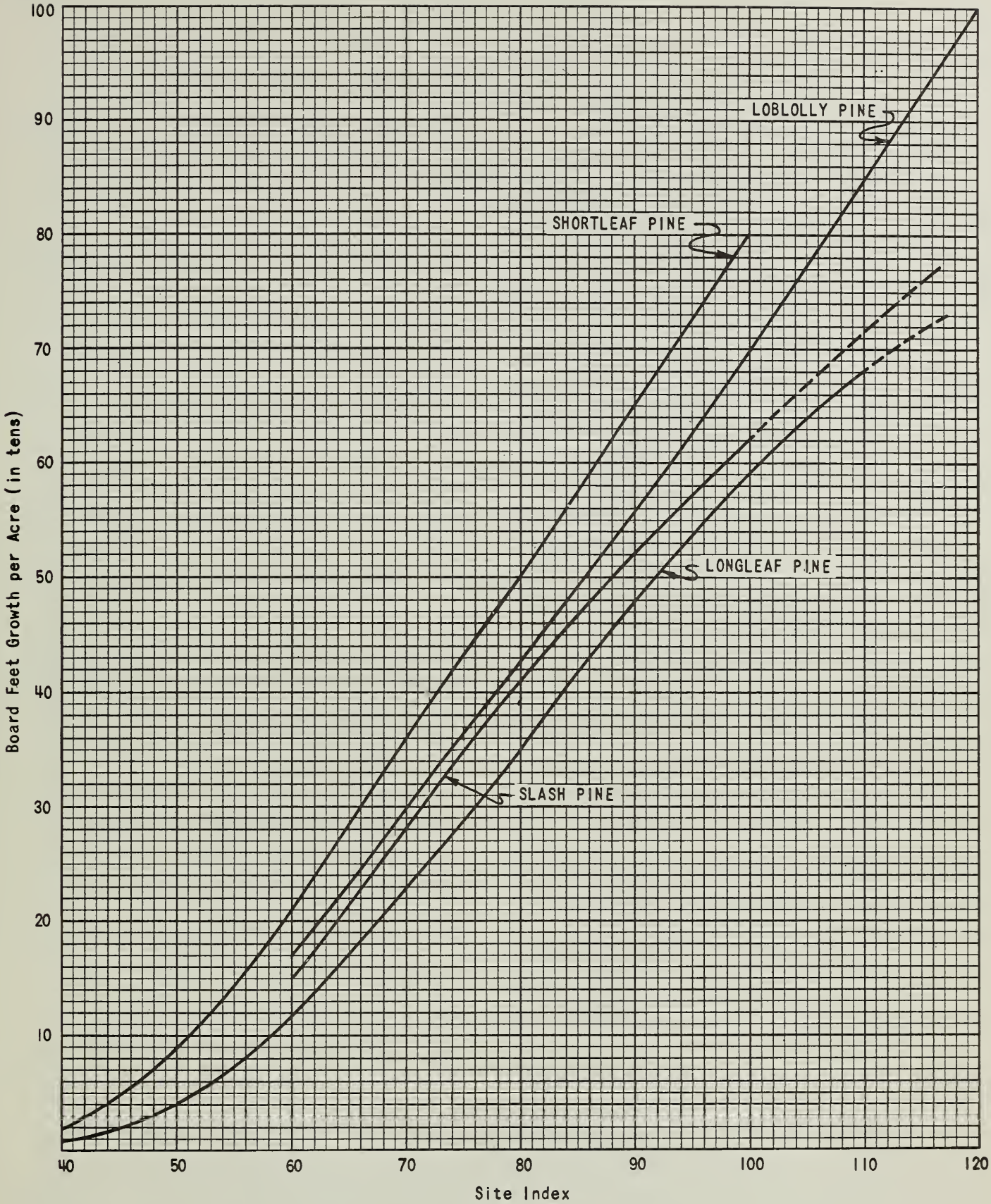
Soil series. A group of soils that have the same profile characteristics and the same general range in color, structure, consistence, and sequence of horizons; the same general conditions of relief and drainage; and, usually, a common or similar origin and mode of formation. A group of soil types similar in all respects except for the texture of the surface soil.

Soil solum (sola - plural). The genetic soil developed by soil-building forces. In normal soils, the solum includes the A and B horizons, or the upper part of the soil profile above the parent material.

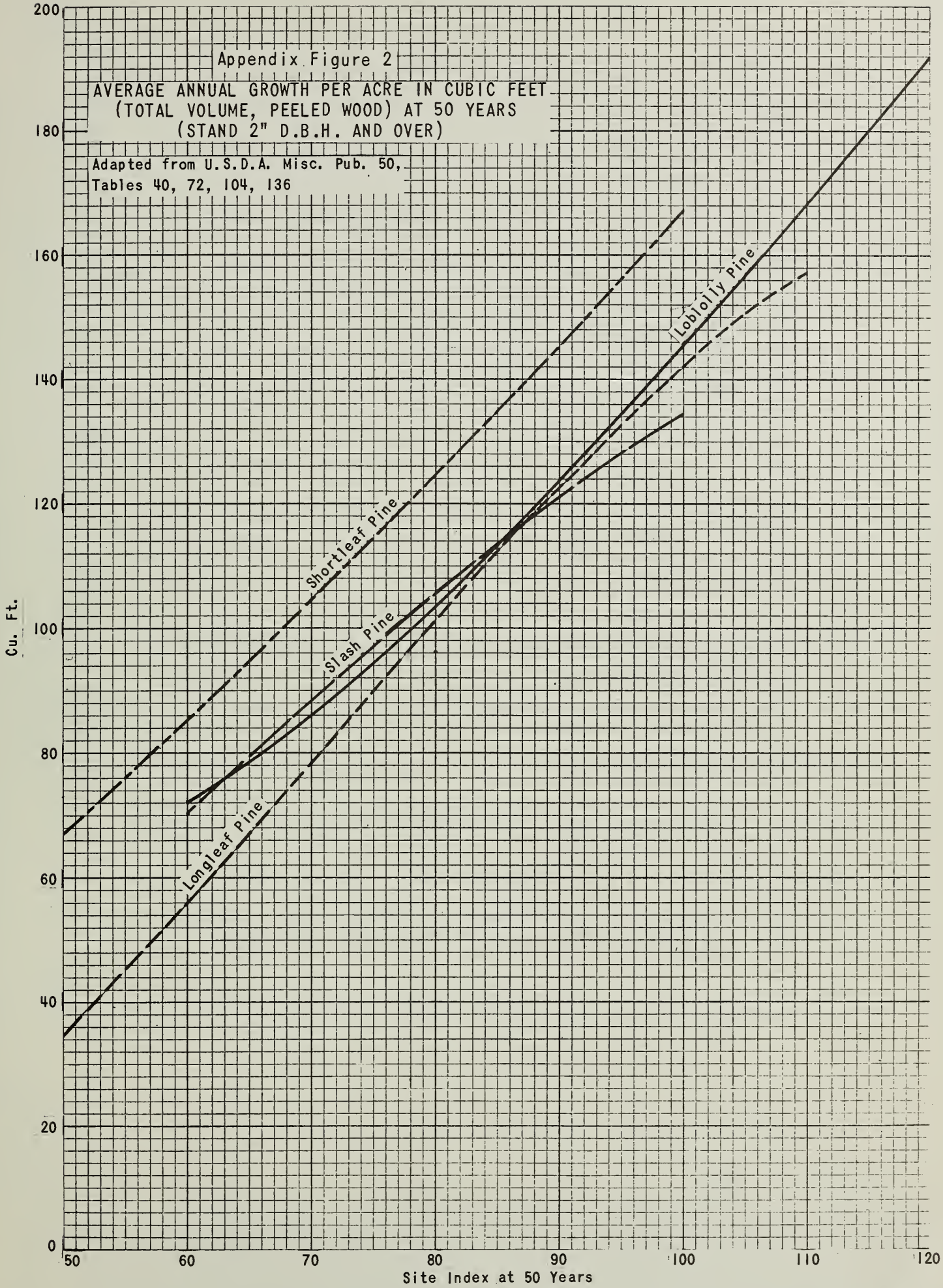
Soil type. A subdivision of the soil series based on the texture of the surface soil.

Water supplying capacity. The capacity (or ability) of soil to hold water against gravity.

Woodcrop. A forest cover type. A species or combination of species of woody plants that may be harvested during the current and ensuing rotations and for which potential soil productivity information is useful.



Appendix Figure 1. Average Annual per Acre Growth (Board Feet, Scribner, Trees 8 Inches Diameter Breast Height and Over) of 50-Year-Old, Well-Stocked, Unmanaged Stands of Southern Pines. (Adapted from U. S. Dept. of Agriculture, Misc. Publ. No. 50.)


Appendix Figure 2
AVERAGE ANNUAL GROWTH PER ACRE IN CUBIC FEET
(TOTAL VOLUME, PEELED WOOD) AT 50 YEARS
(STAND 2" D.B.H. AND OVER)
Adapted from U.S.D.A. Misc. Pub. 50,
Tables 40, 72, 104, 136
Shortleaf Pine
Slash Pine
Longleaf Pine
Loblolly Pine
Cu. Ft.
0
20
40
60
80
100
120
140
160
180
200
50
60
70
80
90
100
110
120
Site Index at 50 Years

Appendix Table 1 - Soil Site Index Correlation Plot Data for Four Southern Pines in the Southern Piedmont of South Carolina (Land Resource Area 136)

SOIL MAPPING UNIT		PLOT NUMBER AND COUNTY	SLOPE POSITION	CLIMATIC INFORMATION			TREE MEASUREMENTS [1]															
				PRECIPITATION			LOBLOLLY PINE				SHORTLEAF PINE				VIRGINIA PINE				LONGLEAF PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES			ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Alamance silt loam	A-1	83a Saluda		44	24	233	2	42	67	73												
Alamance silt loam	A-1	597 Saluda		45	24	231	3	35	76	89*												
Alamance silt loam	B-1	577 McCormick	Upper	47	28	233	3	32	66	81												
Alamance silt loam	B-1	578 McCormick	Upper	47	28	233	3	50	68	68												
Alamance silt loam	B-1	579 McCormick	Upper	46	28	233	1	49	65	66	3	47	61	62								
Alamance silt loam	B-1	580 McCormick	Upper	46	28	234	2	36	66	76												
Alamance silt loam	B-1	609 Saluda	Upper	44	24	233	4	34	69	82*												
Alamance silt loam	B-1	1a Richland	Lower	44	29	240													1	38	63	73
Alamance silt loam	B-1	411 Lexington	Lower	43	29	239	2	46	85	89*												
Alamance silt loam	B-1	603 Saluda	Lower	46	24	231	3	43	82	87	3	46	73	76								
Altavista silt loam	A-1	89 Chesterfield		46	31	218	2	34	79	95												
Altavista silt loam	A-1	563 Fairfield		45	28	238	2	43	86	91												
Appling sandy loam	A-1	51 Chester		48	30	223	2	49	86	87												
Appling sandy loam	B-1	55 Chester	Upper	48	30	226	1	40	64	70												
Appling sandy loam	B-1	552 Fairfield	Upper	45	28	234	2	34	73	87	4	38	66	76								
Appling sandy loam	B-1	676 Anderson	Upper	50	30	222					3	33	46	58	2	33	57	70				
Appling sandy loam	B-1	768 Greenville	Upper	56	31	220					3	36	62	73								
Appling sandy loam	B-1	832 York	Upper	47	25	222					3	47	58	60								
Appling sandy loam	B-1	0 Fairfield	Mid	46	28	232	1	--	--	90												
Appling sandy loam	B-1	0 Fairfield	Mid	46	28	232	1	--	--	93												
Appling sandy loam	B-1	0 Fairfield	Mid	46	28	232	1	--	--	74												
Appling sandy loam	B-1	0 Chester	Mid	47	30	228					1	--	--	64								
Appling sandy loam	C-1	75 Newberry	Upper	47	28	223	1	55	74	72												
Appling sandy loam	C-1	75 Newberry	Mid	47	28	223	1	53	71	69												
Appling sandy loam	C-1	762 Greenville	Mid	52	30	221					1	54	65	62								
Appling sandy loam	C-1	767 Greenville	Mid	56	31	220					3	51	61	60								
Appling sandy loam	C-1	65 York	Mid	48	26	221					7	32	50	63								
Appling sandy loam	D-1	652 Laurens	Mid	50	30	220					3	46	56	58								
Appling sandy loam	D-1	48 Union	Lower	48	25	220	1	47	100	102*												
Appling sandy loam	B-2	552a Fairfield	Upper	45	28	234	5	35	64	76												
Appling sandy loam	B-2	51 Chester	Upper	48	30	223	1	50	81	81												
Appling sandy loam	B-2	330 Edgefield	Upper	45	29	239					2	41	53	58								
Appling sandy loam	B-2	677 Anderson	Upper	50	30	222					3	33	43	53								
Appling sandy loam	B-2	678 Anderson	Upper	50	30	222					2	49	52	53								
Appling sandy loam	B-2	679 Anderson	Upper	50	30	221					3	52	65	63								
Appling sandy loam	B-2	759 Greenville	Upper	57	31	220					2	33	52	65	2	33	54	67				
Appling sandy loam	B-2	55 Chester	Mid	48	30	226	1	39	68	77												
Appling sandy loam	B-2	56 Chester	Mid	47	30	229					2	34	52	64								
Appling sandy loam	B-2	48 Union	Lower	48	25	220	1	47	87	89*	2	43	69	74								
Appling sandy loam	B-2	722 Pickens	Lower	67	33	202					2	31	64	82*								
Appling sandy loam	C-2	817 Laurens	Upper	48	28	218	1	31	55	70	1	44	59	63								
Appling sandy loam	C-2	833 York	Upper	47	25	222					1	47	55	56								
Appling sandy loam	C-2	56 Chester	Mid	47	30	229					4	33	58	73*								
Appling sandy loam	C-2	833 York	Mid	47	25	222					1	49	60	61								
Appling sandy loam	D-2	48 Union	Upper	48	25	220	3	44	76	80												
Appling sandy loam	D-2	677 Anderson	Upper	50	30	222					1	31	40	50								
Appling sandy loam	D-2	65 York	Lower	48	26	221									4	32	47	57				
Appling sandy clay loam	B-3	826 York	Upper	48	26	217					3	33	50	62								
Appling sandy clay loam	C-3	826 York	Upper	48	26	217					1	30	56	74								
Appling sandy clay loam	D-3	826 York	Upper	48	26	217					2	34	53	66								
Bradley sandy loam	B-1	32-4 Lexington	Upper	43	29	240													5	51	57	56
Bradley sandy loam	B-1	32-5 Lexington	Mid	43	29	239	5	54	85	82												
Bradley sandy loam	C-2	611 Saluda	Lower	44	24	238	1	34	92	110*												
Cataula fine sandy loam	B-1	622 Newberry	Upper	48	28	217	3	35	60	69	2	35	57	69								
Cataula fine sandy loam	B-2	S-16 Fairfield	Upper	45	28	235	3	36	56	65	2	40	49	55								
Cataula fine sandy loam	B-2	809 Newberry	Upper	48	28	217	2	36	68	78												
Cataula fine sandy loam	B-2	S-15 Fairfield	Upper	45	28	234					5	66	55	48								
Cataula fine sandy loam	B-2	60-10 Spartanburg	Upper	49	25	215					4	41	47	53								
Cataula fine sandy loam	C-2	617 Newberry	Upper	48	28	219	2	48	69	70												
Cataula fine sandy loam	C-2	800 Newberry	Upper	48	28	218	3	40	67	73												
Cataula fine sandy loam	C-2	60-14 Union	Mid	49	25	210	4	32	65	80												
Cataula fine sandy loam	D-2	808 Newberry	Mid	48	28	218	2	35	66	77												
Cataula clay loam	B-3	115FS Spartanburg	--	51	26	210					4	30	42	59								
Cataula clay loam	B-3	S-14 Fairfield	Upper	46	28	234					5			48								
Cataula clay loam	B-3	623 Newberry	Upper	48	28	217	1	32	46	56												

Appendix Table 1 - Soil Site Index Correlation Plot Data for Four Southern Pines in the Southern Piedmont of South Carolina (Land Resource Area 136)

SOIL MAPPING UNIT		PLOT NUMBER AND COUNTY	SLOPE POSITION	CLIMATIC INFORMATION			TREE MEASUREMENTS 1/															
				PRECIPITATION			LOBLOLLY PINE				SHORTLEAF PINE				VIRGINIA PINE				LONGLEAF PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES			ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Cataula clay loam (cont'd.)	B-3	653 Laurens	Upper	49	29	220	3	33	64	78												
Cataula clay loam	B-3	799 Newberry	Upper	48	28	218	2	41	53	58												
Cataula clay loam	C-3	55 Chester	Upper	48	30	226	3	38	63	71												
Cataula clay loam	C-3	799 Newberry	Mid	48	28	218	1	57	72	69												
Cataula clay loam	C-3	60-7 Union	Lower	49	25	214					4	47	40	42								
Catalua clay loam	D-3	808 Newberry	Mid	48	28	218	2	36	61	70												
Cataula clay loam	D-3	654 Laurens	Lower	49	29	220					1	56	74	70								
Cataula clay loam	E-3	618 Newberry	Upper	48	28	218	2	37	64	73												
Cataula clay loam	E-3	800 Newberry	Upper	48	28	218	3	49	69	70												
Cataula clay loam	E-3	99FS York	--	49	25	212					4	57	74	69								
Cecil sandy loam	A-1	0 Chester	Mid	47	30	228	1	--	--	85												
Cecil sandy loam	B-1	52 Chester	Upper	47	30	228	1	38	67	75												
Cecil sandy loam	B-1	330 Edgefield	Upper	45	29	239	1	34	51	65	1	42	53	57								
Cecil sandy loam	B-1	689 Greenwood	Upper	48	28	230	2	34	63	76												
Cecil sandy loam	B-1	819 Laurens	Upper	48	28	219	3	40	70	77												
Cecil sandy loam	B-1	572 McCormick	Upper	48	28	228					2	66	89	78								
Cecil sandy loam	B-1	671 Anderson	Upper	51	30	220					3	70	72	61								
Cecil sandy loam	B-1	761 Greenville	Upper	52	30	221					3	39	55	62								
Cecil sandy loam	B-1	764 Greenville	Upper	51	30	222					2	41	52	58								
Cecil sandy loam	B-1	768 Greenville	Upper	56	31	220					2	38	62	71								
Cecil sandy loam	B-1	129FS Union	--	50	28	209					4	63	72	64								
Cecil sandy loam	B-1	A1 Anderson	Mid	51	30	218					1	58	65	60								
Cecil sandy loam	B-1	536 Spartanburg	Mid	56	28	200					1	50	66	66								
Cecil sandy loam	B-1	670 Anderson	Mid	52	30	219					1	45	70	74								
Cecil sandy loam	B-1	12-3 Chester	Mid	47	30	232	5	37	63	72												
Cecil sandy loam	B-1	24-1a Greenwood	Mid	48	28	231	4	48	91	92*												
Cecil sandy loam	B-1	536 Spartanburg	Lower	56	28	200					3	52	71	70								
Cecil sandy loam	C-1	571 McCormick	Upper	48	28	228	1	68	98	89*												
Cecil sandy loam	C-1	548 Cherokee	Upper	50	31	212					3	37	56	66								
Cecil sandy loam	C-1	735 Oconee	Mid	58	28	205					3	57	74	69	2	51	75	74				
Cecil sandy loam	C-1	563 Fairfield	Mid	45	28	238	2	41	86	94*												
Cecil sandy loam	C-1	62 York	Mid	48	26	221					1	57	72	67								
Cecil sandy loam	C-1	711 Pickens	Mid	58	29	210					1	37	62	73								
Cecil sandy loam	C-1	745 Oconee	Mid	56	26	209					2	53	71	69								
Cecil sandy loam	C-1	747 Oconee	Mid	57	27	211					2	34	57	71								
Cecil sandy loam	C-1	762 Greenville	Mid	52	30	221					1	51	64	63								
Cecil sandy loam	C-1	711 Pickens	Lower	58	29	210					3	43	66	72								
Cecil sandy loam	C-1	60-3 Cherokee	Lower	50	26	210					4	35	48	60								
Cecil sandy loam	C-1	803 Newberry	Lower	47	28	219	2	35	74	87*												
Cecil sandy loam	C-1	96FS Union	--	49	27	210					4	57	60	56								
Cecil sandy loam	C-1	104FS York	--	49	25	214					4	65	72	63								
Cecil sandy loam	D-1	534 Spartanburg	Mid	57	28	199									3	36	63	73				
Cecil sandy loam	D-1	745 Oconee	Mid	56	26	209					2	61	68	61								
Cecil sandy loam	D-1	756 Greenville	Mid	58	31	218					2	60	80	73								
Cecil sandy loam	D-1	756a Greenville	Lower	58	31	218					1	64	81	72	1	63	86	82				
Cecil sandy loam	D-1	535 Spartanburg	Lower	57	29	198					3	37	51	60								
Cecil sandy loam	D-1	645 Laurens	Lower	49	29	218					3	53	59	57								
Cecil sandy loam	E-1	732 Oconee	Mid	58	28	205					3	42	57	62								
Cecil sandy loam	E-1	143FS Pickens	--	58	28	208					4	67	61	53								
Cecil sandy loam	E-1	116FS Spartanburg	--	51	26	210					4	33	44	58								
Cecil sandy loam	E-1	141FS Pickens	--	58	28	208					4	59	74	68								
Cecil sandy loam	E-1	147FS Pickens	--	58	28	208					4	52	66	65								
Cecil sandy loam	F-1	146FS Pickens	--	58	28	208					3	60	74	68								
Cecil sandy loam	F-1	148FS Pickens	--	58	28	208					4	64	76	67								
Cecil sandy loam	A-2	561 Fairfield	Upper	45	28	236	3	33	73	88												
Cecil sandy loam	B-2	28FS Chester	--	47	31	227					4	65	53	47								
Cecil sandy loam	B-2	127FS Union	--	50	28	209					4	66	69	61								
Cecil sandy loam	B-2	532 Spartanburg	Upper	56	28	200									3	40	58	64				
Cecil sandy loam	B-2	665 Anderson	Upper	52	30	218									1	46	70	72				
Cecil sandy loam	B-2	56 Chester	Upper	47	30	229					3	33	51	63								
Cecil sandy loam	B-2	61 York	Upper	48	26	221					6	33	51	63								
Cecil sandy loam	B-2	544 Cherokee	Upper	48	26	210					2	30	50	67								
Cecil sandy loam	B-2	585 Abbeville	Upper	49	29	226					4	33	47	58								
Cecil sandy loam	B-2	588 Abbeville	Upper	49	29	223					3	38	59	69								
Cecil sandy loam	B-2	670 Anderson	Upper	52	30	219					1	45	60	63								
Cecil sandy loam	B-2	690 Greenwood	Upper	48	28	231					1	33	58	72								

Appendix Table 1 - Soil Site Index Correlation Plot Data for Four Southern Pines in the Southern Piedmont of South Carolina (Land Resource Area 136)

SOIL MAPPING UNIT				CLIMATIC INFORMATION			TREE MEASUREMENTS 1/															
				PRECIPITATION			LOBLOLLY PINE				SHORTLEAF PINE				VIRGINIA PINE				LONGLEAF PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES	PLOT NUMBER AND COUNTY	SLOPE POSITION	ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Cecil sandy loam (cont'd.)	B-2	816 Laurens	Upper	49	29	219					1	32	56	72								
Cecil sandy loam	B-2	542 Spartanburg	Upper	51	26	210					4	45	58	61								
Cecil sandy loam	B-2	55 Chester	Upper	48	30	226	3	36	64	74												
Cecil sandy loam	B-2	331 Edgefield	Upper	45	30	241	1	30	55	70												
Cecil sandy loam	B-2	629 Newberry	Upper	46	28	227	2	35	71	84												
Cecil sandy loam	B-2	690 Greenwood	Upper	48	28	231	2	33	59	72												
Cecil sandy loam	B-2	804 Newberry	Upper	47	28	219	1	35	67	80												
Cecil sandy loam	B-2	820 Laurens	Upper	48	28	219	2	34	66	80												
Cecil sandy loam	B-2	12-3 Chester	Mid	47	30	232	5	37	63	72												
Cecil sandy loam	B-2	52 Chester	Mid	47	30	228	8	34	59	70												
Cecil sandy loam	B-2	0 Fairfield	Mid	46	28	232	1	--	--	80												
Cecil sandy loam	B-2	810 Newberry	Mid	47	28	222	2	37	71	81												
Cecil sandy loam	B-2	56 Chester	Mid	47	30	229					1	32	53	68								
Cecil sandy loam	B-2	536 Spartanburg	Mid	56	28	200					2	50	67	67								
Cecil sandy loam	B-2	651 Laurens	Mid	50	30	221					2	36	56	66								
Cecil sandy loam	B-2	670 Anderson	Mid	52	30	219					1	45	64	68								
Cecil sandy loam	B-2	536 Spartanburg	Mid	56	28	200									2	47	66	67				
Cecil sandy loam	B-2	24-1a Greenwood	Lower	48	28	231					1	49	75	76*								
Cecil sandy loam	B-2	60-13 Union	Lower	49	25	209	4	38	72	85												
Cecil sandy loam	B-2	60-39 Fairfield	Lower	46	28	231	5	55	76	73												
Cecil sandy loam	C-2	817 Laurens	Upper	48	28	218	1	36	63	73												
Cecil sandy loam	C-2	649 Laurens	Upper	50	30	220					1	34	54	68								
Cecil sandy loam	C-2	548 Cherokee	Upper	50	31	212					3	39	52	60								
Cecil sandy loam	C-2	675 Anderson	Upper	50	30	223					3	42	52	58								
Cecil sandy loam	C-2	746 Oconee	Upper	56	26	210					3	45	60	63								
Cecil sandy loam	C-2	540 Spartanburg	Upper	51	26	208					2	42	70	77								
Cecil sandy loam	C-2	543 Spartanburg	Upper	50	26	210					3	37	49	57								
Cecil sandy loam	C-2	728 Oconee	Mid	60	29	204					3	32	53	69								
Cecil sandy loam	C-2	19-1c Edgefield	Mid	46	28	233	3	52	75	73	2	44	67	71								
Cecil sandy loam	C-2	666 Anderson	Mid	54	30	210					2	51	71	70								
Cecil sandy loam	C-2	718 Pickens	Mid	59	30	208					4	40	60	68								
Cecil sandy loam	C-2	719 Pickens	Mid	58	30	210					2	39	53	60								
Cecil sandy loam	C-2	748 Oconee	Mid	56	26	212					2	34	52	64								
Cecil sandy loam	C-2	760 Greenville	Mid	53	30	221					3	39	53	60								
Cecil sandy loam	C-2	818 Laurens	Mid	48	28	219					1	33	61	76								
Cecil sandy loam	C-2	589 Abbeville	Mid	49	29	224					1	41	58	64								
Cecil sandy loam	C-2	649 Laurens	Mid	50	30	220					2	32	57	72								
Cecil sandy loam	C-2	52 Chester	Mid	47	30	228	3	36	69	79												
Cecil sandy loam	C-2	630 Newberry	Mid	46	28	227	2	32	68	83												
Cecil sandy loam	C-2	818 Laurens	Mid	48	28	219	2	32	64	79												
Cecil sandy loam	C-2	589 Abbeville	Mid	49	29	224	2	41	65	71												
Cecil sandy loam	C-2	558 Fairfield	Lower	45	28	236	3	33	70	88*												
Cecil sandy loam	C-2	729 Oconee	Lower	60	29	204					1	48	59	60								
Cecil sandy loam	C-2	817 Laurens	Lower	48	28	218	1	30	63	80												
Cecil sandy loam	D-2	667 Anderson	Upper	50	30	221					4	44	54	58								
Cecil sandy loam	D-2	752 Oconee	Upper	64	31	203					3	33	62	77								
Cecil sandy loam	D-2	542 Spartanburg	Upper	51	26	210					2	45	67	70								
Cecil sandy loam	D-2	711 Pickens	Mid	58	29	210									1	33	61	74				
Cecil sandy loam	D-2	667 Anderson	Mid	50	30	221					2	40	54	60								
Cecil sandy loam	D-2	827 York	Mid	48	26	217					1	33	50	63								
Cecil sandy loam	D-2	330 Edgefield	Mid	45	29	239					1	42	50	55								
Cecil sandy loam	D-2	686 Anderson	Mid	56	31	218					1	43	61	66								
Cecil sandy loam	D-2	690 Greenwood	Mid	48	28	231	1	33	66	80												
Cecil sandy loam	D-2	541 Spartanburg	Lower	50	26	210					1	56	69	65								
Cecil sandy loam	D-2	686 Anderson	Lower	56	31	218					2	41	57	63								
Cecil sandy loam	E-2	333 Edgefield	Mid	45	29	239	2	38	75	84												
Cecil sandy loam	E-2	751 Oconee	Mid	65	31	203					3	33	48	60								
Cecil sandy loam	E-2	550 Cherokee	Mid	49	28	218					3	37	64	75*								
Cecil sandy loam	E-2	333 Edgefield	Lower	45	29	239	2	39	76	85												
Cecil sandy loam	E-2	750 Oconee	Lower	60	30	205					2	50	69	69								
Cecil sandy loam	E-2	751 Oconee	Lower	65	31	203					1	33	54	69								
Cecil sandy loam	E-2	550 Cherokee	Lower	49	28	218					1	38	71	82*								
Cecil clay loam	B-3	52 Chester	Upper	47	30	228	2	44	70	73												
Cecil clay loam	B-3	590 Abbeville	Upper	49	28	220	2	32	59	74	2	32	50	64								
Cecil clay loam	B-3	562 Fairfield	Upper	45	28	236	3	38	75	85												

Appendix Table 1 - Soil Site Index Correlation Plot Data for Four Southern Pines in the Southern Piedmont of South Carolina (Land Resource Area 136)

SOIL MAPPING UNIT				CLIMATIC INFORMATION			TREE MEASUREMENTS 1/															
				PRECIPITATION			LOBLOLLY PINE				SHORTLEAF PINE				VIRGINIA PINE				LONGLEAF PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES	PLOT NUMBER AND COUNTY	SLOPE POSITION	ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Cecil clay loam (cont'd.)	B-3	576 McCormick	Upper	48	28	228	1	34	55	66												
Cecil clay loam	B-3	619 Newberry	Upper	48	28	218	3	37	60	68												
Cecil clay loam	B-3	628 Newberry	Upper	45	28	232	2	32	63	80												
Cecil clay loam	B-3	12-2 Chester	Upper	47	30	232					5	37	52	60								
Cecil clay loam	B-3	646 Laurens	Upper	49	29	218					2	45	51	54								
Cecil clay loam	B-3	648 Laurens	Upper	49	29	218					2	34	52	64								
Cecil clay loam	B-3	688 Greenwood	Upper	49	28	225					1	32	44	55								
Cecil clay loam	B-3	68 Lancaster	Upper	47	31	227					1	31	44	57								
Cecil clay loam	B-3	657 Laurens	Mid	48	28	219					1	38	50	58								
Cecil clay loam	B-3	0 Fairfield	Mid	46	28	232	3	--	--	64												
Cecil clay loam	B-3	661 Laurens	Lower	48	28	219	2	34	68	81												
Cecil clay loam	B-3	649 Laurens	Lower	50	30	220					2	31	51	66*								
Cecil clay loam	B-3	60-12 Union	Lower	49	25	208	3	35	82	96*												
Cecil clay loam	C-3	656 Laurens	Upper	48	28	219	2	36	62	72												
Cecil clay loam	C-3	73 Newberry	Upper	48	28	218	4	32	53	65												
Cecil clay loam	C-3	540 Spartanburg	Upper	51	26	208					1	39	59	69								
Cecil clay loam	C-3	544 Cherokee	Upper	50	31	214					1	34	50	61								
Cecil clay loam	C-3	549 Cherokee	Upper	49	28	218					4	31	59	77								
Cecil clay loam	C-3	646 Laurens	Upper	49	29	218					1	56	61	57								
Cecil clay loam	C-3	656 Laurens	Upper	48	28	219					2	44	54	59								
Cecil clay loam	C-3	675 Anderson	Upper	50	30	223					1	42	51	55								
Cecil clay loam	C-3	765 Greenville	Upper	54	30	221					1	52	63	62								
Cecil clay loam	C-3	684 Anderson	Upper	56	31	218					1	37	50	59								
Cecil clay loam	C-3	718 Pickens	Mid	59	30	208									2	32	52	64				
Cecil clay loam	C-3	657 Laurens	Mid	48	28	219					1	35	39	46								
Cecil clay loam	C-3	666 Anderson	Mid	54	30	210					2	50	59	59								
Cecil clay loam	C-3	685 Anderson	Mid	56	31	218					2	38	53	61								
Cecil clay loam	C-3	697 Greenwood	Mid	48	28	230					2	39	55	64								
Cecil clay loam	C-3	60-27 Newberry	Mid	46	28	224	5	40	60	68												
Cecil clay loam	C-3	52 Chester	Lower	47	30	228	1	42	76	81												
Cecil clay loam	C-3	686 Anderson	Lower	56	31	218					2	33	54	68								
Cecil clay loam	D-3	655 Laurens	Upper	48	28	219	2	34	60	71												
Cecil clay loam	D-3	697 Greenwood	Upper	48	28	230	1	43	72	76												
Cecil clay loam	D-3	57 Chester	Upper	47	29	227	5	38	52	58												
Cecil clay loam	D-3	755 Greenville	Mid	58	31	218									3	42	69	72				
Cecil clay loam	D-3	672 Anderson	Mid	51	30	220					2	42	62	68								
Cecil clay loam	D-3	718 Pickens	Mid	59	30	208					1	39	64	72								
Cecil clay loam	D-3	744 Oconee	Mid	58	28	208					2	40	52	59								
Cecil clay loam	D-3	829 York	Mid	48	26	219					3	45	60	63								
Cecil clay loam	D-3	666 Anderson	Mid	54	30	210					1	49	64	65								
Cecil clay loam	D-3	655 Laurens	Mid	48	28	219	1	34	67	80												
Cecil clay loam	D-3	697 Greenwood	Mid	48	28	230	2	42	69	74												
Cecil clay loam	D-3	698 Greenwood	Mid	48	28	229	2	36	66	73												
Cecil clay loam	D-3	810 Newberry	Mid	47	28	222	2	38	71	80												
Cecil clay loam	D-3	655 Laurens	Lower	48	28	219	1	37	74	84												
Cecil clay loam	D-3	19-2 Edgefield	Lower	46	28	234	5	55	82	79												
Cecil clay loam	D-3	59 Chester	Lower	47	29	230	1	30	64	81												
Cecil clay loam	D-3	729 Oconee	Lower	60	29	204					4	57	72	67								
Cecil clay loam	D-3	666 Anderson	Lower	54	30	210					1	65	75	65								
Cecil clay loam	E-3	70 Lancaster	Upper	46	31	228	1	45	56	58												
Cecil clay loam	E-3	54 Chester	Upper	47	29	230	6	43	78	83*												
Cecil clay loam	E-3	749 Oconee	Upper	56	26	211					2	58	70	65								
Cecil clay loam	E-3	70 Lancaster	Upper	46	31	228					1	55	63	60								
Cecil clay loam	E-3	720 Pickens	Mid	60	31	208									3	42	69	74				
Cecil clay loam	E-3	668 Anderson	Mid	50	30	220					3	34	61	74								
Cecil clay loam	E-3	669 Anderson	Mid	53	30	216					3	39	63	72								
Cecil clay loam	E-3	744 Oconee	Mid	58	28	208					3	40	50	57								
Cecil clay loam	E-3	70 Lancaster	Mid	46	31	228					1	53	63	61								
Cecil clay loam	E-3	584 Abbeville	Mid	49	29	226	3	36	69	79												
Cecil clay loam	E-3	810 Newberry	Lower	47	28	222	2	43	86	91*												
Cecil clay loam	E-3	657 Laurens	Lower	48	28	219					1	44	59	63								
Cecil clay loam	E-3	70 Lancaster	Lower	46	31	228					2	52	62	60								
Cecil clay loam	E-3	117FS Spartanburg	--	51	26	210					4	51	59	58								
Cecil clay loam	F-3	641 Laurens	Upper	49	29	218					2	45	65	68								
Cecil clay loam	F-3	647 Laurens	Mid	49	29	218					2	48	67	69								
Cecil clay loam	F-3	583 McCormick	Mid	46	28	235	1	42	75	80	2	50	67	67					3	41	68	75

Appendix Table 1 - Soil Site Index Correlation Plot Data for Four Southern Pines in the Southern Piedmont of South Carolina (Land Resource Area 136)

SOIL MAPPING UNIT				CLIMATIC INFORMATION			TREE MEASUREMENTS 1/															
				PRECIPITATION			LOBLOLLY PINE				SHORTLEAF PINE				VIRGINIA PINE				LONGLEAF PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES	PLOT NUMBER AND COUNTY	SLOPE POSITION	ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Cecil clay loam (cont'd.)	F-3	749 Oconee	Mid	56	26	211					2	42	60	66								
Cecil clay loam	F-3	583 McCormick	Lower	46	28	235	1	43	84	95*	2	50	67	67								
Cecil clay loam	F-3	669 Anderson	Lower	53	30	216					2	33	63	78								
Chesterfield sandy loam	C-1	611 Saluda	Lower	44	24	238	1	45	93	97*												
Chesterfield fine sandy loam	B-1	82 Chesterfield	Upper	46	31	217	7	30	49	63												
Chesterfield fine sandy loam	B-1	407 Lexington	Mid	43	29	239													1	66	82	72
Chesterfield fine sandy loam	C-1	83 Chesterfield	Lower	46	31	217	6	57	79	76	2	58	76	70					3	59	68	62
Chewacla silt loam	A-1	8a Richland		44	29	240	2	33	90	110									1	59	80	73
Chewacla silt loam	A-1	722 Pickens		67	33	202					2	34	72	88								
Colfax sandy loam	B-1	650 Laurens	Mid	50	30	221					3	51	68	67								
Colfax sandy loam	B-1	766 Greenville	Lower	54	30	229					2	43	64	70								
Colfax sandy loam	C-1	65 York	Lower	48	26	221					2	31	46	62								
Colfax sandy loam	B-2	588 Abbeville	Upper	49	29	223					3	32	50	63								
Colfax sandy loam	B-2	680 Anderson	Lower	50	30	221	3	49	74	75	1	61	73	65								
Congaree fine sandy loam	A-1	11a Richland		44	29	240	1	30	78	100												
Congaree fine sandy loam	A-1	12a Richland		44	29	240	1	30	72	92												
Congaree fine sandy loam	A-1	702 Greenwood		48	27	230	2	63	119	110												
Congaree fine sandy loam	A-1	741 Oconee		75	34	196					2	50	98	98								
Davidson loam	B-1	60-9 Spartanburg	Mid	50	25	213					4	67	72	65								
Davidson loam	B-1	72 Lancaster	Mid	47	31	228					1	32	44	55								
Davidson loam	B-1	694 Greenwood	Mid	48	27	230	2	30	60	77												
Davidson loam	B-2	50 Union	Upper	49	25	219	8	32	62	76												
Davidson loam	B-2	575 McCormick	Upper	48	28	227	4	36	64	74												
Davidson loam	B-2	50 Union	Mid	49	25	219	1	31	52	65	7	33	50	62								
Davidson loam	B-2	105FS Union	--	50	28	209					3	65	58	51								
Davidson loam	C-2	563 Fairfield	Lower	45	28	238	2	38	86	98*												
Davidson clay loam	C-3	S-17 Chester	Upper	47	30	232					4	32	49	61								
Davidson clay loam	D-3	107FS Union	--	50	28	209					5	38	56	65								
Davidson clay loam	F-3	573 McCormick	Upper	49	28	227	1	36	60	70												
Davidson clay loam	F-3	573a McCormick	Mid	49	28	227	2	35	72	84	3	43	64	70								
Durham sandy loam	A-1	51 Chester		48	30	223	2	49	84	85	6	47	76	78								
Durham sandy loam	B-1	51 Chester	Upper	48	30	223	3	48	82	84												
Durham sandy loam	B-1	631 Newberry	Upper	46	28	224	2	38	69	78												
Durham sandy loam	B-1	78 Newberry	Upper	47	28	223	2	38	60	69												
Durham sandy loam	B-1	60-34 Fairfield	Mid	46	28	231					4	35	58	69								
Durham sandy loam	B-1	631 Newberry	Lower	46	28	224	1	38	74	83												
Durham sandy loam	C-1	624 Newberry	Upper	45	28	229	4	37	69	78												
Durham sandy loam	C-1	75 Newberry	Mid	47	28	223	4	52	78	77												
Durham loamy sand, thick surface	B-1	78 Newberry	Upper	47	28	223	7	39	60	67												
Durham loamy sand, thick surface	B-1	77 Newberry	Upper	47	28	223	5	40	52	58												
Durham loamy sand, thick surface	B-1	36-1 Newberry	Upper	46	28	224	5	39	67	74												
Durham loamy sand, thick surface	B-1	41-5 Saluda	Upper	44	24	236	5	45	63	66												
Durham loamy sand, thick surface	C-1	36-2 Newberry	Mid	46	28	224	5	31	55	68												
Durham loamy sand, thick surface	C-1	36-3 Newberry	Mid	46	28	224	5	45	74	77												
Enon sandy loam	B-1	74 Newberry	Upper	48	28	218	1	49	71	72												
Enon sandy loam	C-1	60-1 Spartanburg	Upper	50	26	210					5	48	56	57								
Enon sandy loam	B-2	823 Chester	Upper	48	29	224	4	39	66	73												
Enon sandy loam	B-2	77 Newberry	Upper	47	28	223	1	33	55	67												
Enon sandy loam	B-2	802 Newberry	Upper	47	28	219	3	36	65	76												
Enon sandy loam	B-2	805 Newberry	Upper	47	28	219	2	33	64	76												
Enon sandy loam	B-2	S-13 Fairfield	Upper	46	28	230	5	33	66	78												
Enon sandy loam	B-2	61 York	Upper	48	26	221					3	33	47	59								
Enon sandy loam	B-2	60-30 Newberry	Mid	47	28	219	5	35	72	84												
Enon sandy loam	B-2	60-35 Fairfield	Mid	46	28	231	5	33	51	61												
Enon sandy loam	B-2	60-28 Newberry	Mid	47	28	223	5	36	65	74												
Enon sandy loam	B-2	60-36 Fairfield	Lower	46	28	232	5	31	64	82												
Enon sandy loam	B-2	60-16 Newberry	Lower	47	28	223	5	31	58	71												
Enon sandy loam	B-2	60-38 Fairfield	Lower	46	28	232	5	48	64	65												
Enon sandy loam	B-2	806 Newberry	Lower	47	28	219	3	34	66	78												
Enon sandy loam	C-2	36-4 Newberry	Mid	46	28	221	5	39	59	66												
Enon sandy loam	C-2	60-5 Cherokee	Mid	51	26	208					5	42	52	58								
Enon sandy loam	C-2	60-17 Newberry	Lower	47	28	224	5	37	64	71	5	30	51	70								
Enon sandy loam	C-2	60-6 Union	Lower	49	25	214																
Enon sandy loam	C-2	701 Greenwood	Lower	48	27	230	2	48	78	80												
Enon sandy loam	C-2	803 Newberry	Lower	47	28	219	2	40	73	80												

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SOIL MAPPING UNIT		PLOT NUMBER AND COUNTY	SLOPE POSITION	CLIMATIC INFORMATION			TREE MEASUREMENTS 1/															
				PRECIPITATION			LOBLOLLY PINE				SHORTLEAF PINE				VIRGINIA PINE				LONGLEAF PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES			ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Enon sandy loam (cont'd.)	C-2	691 Greenwood	Lower	48	28	231	2	55	76	73												
Enon sandy loam	C-2	335 Edgefield	Lower	45	29	239					3	48	56	57								
Enon sandy loam	D-2	66 York	Upper	48	26	222					1	33	45	56								
Enon sandy loam	D-2	658 Laurens	Mid	48	29	223					3	34	50	63								
Enon sandy loam	D-2	690 Greenwood	Mid	48	28	231	3	36	69	80												
Enon clay loam	B-3	24-1b Greenwood	Upper	48	28	231	5	40	67	74												
Enon clay loam	B-3	690 Greenwood	Upper	48	28	231	1	35	70	82												
Enon clay loam	B-3	36-7 Newberry	Lower	45	28	231	5	36	63	73												
Enon clay loam	C-3	0 Fairfield	Mid	46	28	232					1	--	--	46								
Enon clay loam	E-3	798 Newberry	Lower	47	28	222	2	32	53	62												
Efland silt loam	B-1	610 Saluda	Upper	45	24	233					2	61	74	67								
Efland silt loam	B-1	2a Richland	Upper	44	39	240					1	38	43	48								
Efland silt loam	B-2	41-2 Saluda	Upper	44	24	233	5	39	73	82												
Efland silt loam	B-2	85a Saluda	Upper	44	24	233	3	34	66	79												
Efland silt loam	B-2	608 Saluda	Mid	45	24	232	3	38	72	82												
Efland silt loam	C-2	36-9 Newberry	Lower	45	28	232	5	38	64	73												
Georgeville silt loam	A-1	74a Saluda		44	24	233	1	50	87	87												
Georgeville silt loam	B-1	568 McCormick	Upper	47	28	232	1	34	65	76												
Georgeville silt loam	B-1	87a Richland	Upper	44	29	240	1	33	71	86												
Georgeville silt loam	B-1	569 McCormick	Upper	47	28	232	2	33	68	82												
Georgeville silt loam	B-1	19-1a Edgefield	Upper	46	28	233	2	45	59	64	1	52	62	60					2	55	65	62
Georgeville silt loam	D-1	32-1 Lexington	Lower	43	29	239	3	36	76	88									3	50	72	72
Georgeville silt loam	B-2	74a Richland	Upper	43	29	241	3	40	66	72	3	54	67	64					4	58	62	57
Georgeville silt loam	B-2	568 McCormick	Upper	47	28	232	2	34	62	74												
Georgeville silt loam	B-2	596 Saluda	Upper	46	24	226	3	33	62	75												
Georgeville silt loam	B-2	569 McCormick	Upper	47	28	232	1	38	60	66												
Georgeville silt loam	B-2	40-1 Richland	Upper	43	29	241	5	35	57	79												
Georgeville silt loam	B-2	565 Fairfield	Upper	45	29	240													2	41	55	61
Georgeville silt loam	B-2	601 Saluda	Upper	46	24	227													1	33	52	66
Georgeville silt loam	B-2	69 Lancaster	Upper	47	31	225					11	54	58	56								
Georgeville silt loam	B-2	602 Saluda	Mid	46	24	227	3	32	57	71												
Georgeville silt loam	B-2	36-5 Newberry	Mid	45	28	232	5	35	64	76												
Georgeville silt loam	B-2	3a Richland	Mid	44	29	240	1	43	79	85	1	53	55	53					1	45	64	67
Georgeville silt loam	C-2	77b Saluda	Mid	44	24	233	2	53	66	83												
Georgeville silt loam	C-2	40-2 Richland	Lower	43	29	241	5	36	74	85												
Georgeville silt loam	D-2	414 Lexington	Upper	44	28	238	1	38	58	65									1	53	65	63
Georgeville silt loam	D-2	564 Fairfield	Upper	45	29	239	1	36	57	65												
Georgeville silt loam	D-2	69 Lancaster	Lower	47	31	225					8	52	62	61								
Georgeville silt loam	E-2	69 Lancaster	Upper	47	31	225					2	59	65	60								
Georgeville silty clay loam	B-3	69 Lancaster	Upper	47	31	225					6	53	57	56								
Georgeville silty clay loam	B-3	78a Saluda	Upper	44	24	233	2	31	54	67	2	31	51	66								
Georgeville silty clay loam	B-3	612 Saluda	Upper	45	24	235	4	30	60	76	2	31	54	71								
Georgeville silty clay loam	B-3	76a Saluda	Upper	44	24	233	1	30	54	70	1	30	53	70								
Georgeville silty clay loam	B-3	566 McCormick	Upper	47	28	232	2	31	67	85												
Georgeville silty clay loam	B-3	613 Saluda	Upper	45	24	235					4	33	56	70								
Georgeville silty clay loam	B-3	615 Edgefield	Mid	46	28	235	1	31	55	70	1	32	48	60								
Georgeville silty clay loam	C-3	599 Saluda	Upper	46	24	230					3	50	61	61								
Georgeville silty clay loam	C-3	598 Saluda	Upper	46	24	230					1	35	54	66								
Georgeville silty clay loam	C-3	598 Saluda	Mid	46	24	230					1	43	62	67								
Georgeville silty clay loam	C-3	75a Saluda	Mid	44	24	233	2	34	56	66	2	34	56	69					1	32	54	70
Georgeville silty clay loam	C-3	596 Saluda	Mid	46	24	226	1	36	59	69												
Georgeville silty clay loam	C-3	570 McCormick	Mid	48	28	232	3	38	63	71												
Georgeville silty clay loam	C-3	598 Saluda	Lower	46	24	230					1	32	55.	70*								
Georgeville silty clay loam	C-3	614 Saluda	Lower	46	24	232	3	31	67	84*												
Georgeville silty clay loam	D-3	36-6 Newberry	Mid	45	28	233	5	49	66	67												
Georgeville silty clay loam	D-3	59 Chester	Mid	47	29	230	4	31	63	69												
Georgeville silty clay loam	D-3	29-5 Lancaster	Mid	46	31	232					5	53	62	59								
Goldston silt loam	B-2	6a Richland	Mid	44	29	240	1	43	62	66	2	60	51	48								
Goldston silt loam	B-2	41-6 Saluda	Mid	44	24	233	3	36	67	76												
Goldston silt loam	C-2	82a Saluda	Upper	44	24	233	2	64	76	71												
Goldston silt loam	C-2	606 Saluda	Upper	46	24	230	1	30	64	81	1	44	56	60								
Goldston silt loam	C-2	19-1b Edgefield	Mid	46	28	233	5	58	69	65	1	67	84	73								
Goldston silt loam	D-2	32-2 Lexington	Upper	43	29	239													5	58	76	71
Goldston silt loam	D-2	80a Saluda	Upper	44	24	233					1	32	52	67					1	34	59	74
Goldston silt loam	D-2	29-7 Lancaster	Upper	46	31	227					5	64	65	57								

Appendix Table 1 - Soil Site Index Correlation Plot Data for Four Southern Pines in the Southern Piedmont of South Carolina (Land Resource Area 136)

SOIL MAPPING UNIT				CLIMATIC INFORMATION			TREE MEASUREMENTS 1/															
				PRECIPITATION			LOBLOLLY PINE				SHORTLEAF PINE				VIRGINIA PINE				LONGLEAF PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES	PLOT NUMBER AND COUNTY	SLOPE POSITION	ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Goldston silt loam (cont'd.)	D-2	80a Saluda	Mid	44	24	233					1	32	52	67								
Goldston silt loam	E-2	19-1 Edgefield	Upper	46	28	233	4	51	68	67	1	49	63	64								
Goldston silt loam	E-2	616 Edgefield	Upper	46	28	234	1	44	80	84*												
Goldston silt loam	E-2	616 Edgefield	Mid	46	28	234	4	35	70	83*												
Goldston silt loam	F-2	89 Chesterfield	Upper	46	31	218	3	35	62	72												
Goldston silt loam	F-2	89 Chesterfield	Mid	46	31	218	4	37	61	70												
Goldston silt loam	F-2	89 Chesterfield	Lower	46	31	218	2	35	70	82	1	32	58	74								
Helena fine sandy loam	B-1	74 Newberry	Upper	48	28	218	6	51	78	77												
Helena fine sandy loam	B-1	664 Laurens	Upper	48	28	215	2	33	75	91												
Helena fine sandy loam	C-1	74 Newberry	Mid	48	28	218	2	55	83	81	1	66	57	50								
Helena fine sandy loam	C-1	60-15 Union	Lower	48	25	217	5	33	79	100												
Helena fine sandy loam	A-2	555 Fairfield	Upper	46	28	233	3	32	67	83												
Helena fine sandy loam	B-2	60 Chester	Upper	47	30	231	3	34	66	78												
Helena fine sandy loam	B-2	336 Edgefield	Upper	45	29	239	1	38	75	84												
Helena fine sandy loam	B-2	555 Fairfield	Upper	46	28	233	3	32	61	76												
Helena fine sandy loam	B-2	61 York	Upper	48	26	221					1	35	45	53								
Helena fine sandy loam	C-2	555 Fairfield	Upper	46	28	233	1	30	50	64												
Helena fine sandy loam	C-2	60 Chester	Mid	47	30	231	5	34	63	76												
Helena fine sandy loam	C-2	53 Chester	Lower	47	28	227	4	31	53	66	1	33	46	57								
Helena fine sandy loam	E-2	654 Laurens	Mid	49	29	220	1	52	79	78												
Helena fine sandy loam	E-2	654 Laurens	Lower	49	29	220	2	53	79	77												
Herndon silt loam	B-1	88a Richland	Upper	44	29	240	1	50	77	77												
Herndon silt loam	B-1	1a Richland	Upper	44	29	240					2	43	58	62					2	49	62	63
Herndon silt loam	B-1	601 Saluda	Upper	46	24	227					3	35	56	68								
Herndon silt loam	B-1	81 Chesterfield	Upper	46	31	217	6	33	60	72	5	31	54	69								
Herndon silt loam	B-1	567 McCormick	Upper	47	28	232	1	45	68	71												
Herndon silt loam	B-1	597 Saluda	Upper	45	24	231	2	33	68	82												
Herndon silt loam	B-1	606 Saluda	Upper	46	24	230	1	30	71	90												
Herndon silt loam	B-1	40-4 Lexington	Mid	44	28	237	5	31	70	89												
Herndon silt loam	B-1	597 Saluda	Mid	45	24	231	1	31	70	89	1	30	63	82*								
Herndon silt loam	B-1	1a Richland	Mid	44	29	240					1	38	57	65					3	40	63	71
Herndon silt loam	B-1	1a Richland	Lower	44	29	240													1	38	63	73
Herndon silt loam	B-1	602 Saluda	Lower	46	24	227	1	34	65	78												
Herndon silt loam	C-1	595 Saluda	Upper	46	24	227	2	47	67	69												
Herndon silt loam	C-1	1a Richland	Mid	44	29	240	2	51	68	67									1	53	64	62
Herndon silt loam	C-1	1a Richland	Lower	44	29	240					1	64	59	52								
Herndon silt loam	D-1	1a Richland	Mid	44	29	240													1	63	67	60
Herndon silt loam	B-2	81a Saluda	Upper	44	24	233													1	31	50	66
Herndon silt loam	B-2	84a Saluda	Upper	44	24	233	2	32	61	74												
Herndon silt loam	B-2	604 Saluda	Upper	46	24	231	3	37	59	67												
Herndon silt loam	B-2	607 Saluda	Mid	45	24	232	2	41	68	74												
Herndon silt loam	B-2	41-3 Saluda	Mid	44	24	233	5	49	75	76												
Herndon silt loam	B-2	41-4 Saluda	Mid	44	24	233	5	45	71	75												
Herndon silt loam	C-2	600 Saluda	Upper	46	24	228	1	32	63	86	2	36	56	67								
Herndon silt loam	C-2	607 Saluda	Upper	45	24	232	1	38	65	73	1	37	59	70								
Herndon silt loam	C-2	29-6 Lancaster	Upper	46	31	227					5	61	62	56								
Herndon silt loam	C-2	600 Saluda	Mid	46	24	228	2	34	69	83												
Herndon silt loam	C-2	607 Saluda	Mid	45	24	232	1	39	70	79												
Herndon silt loam	C-2	81a Saluda	Mid	44	24	233	1	31	58	73	1	32	48	60								
Herndon silt loam	C-2	413 Lexington	Lower	44	28	238	1	35	60	70												
Herndon silt loam	C-2	605 Saluda	Lower	46	24	231	3	47	82	85												
Herndon silt loam	D-2	408 Lexington	Mid	43	29	239	3	41	70	76												
Herndon silt loam	D-2	27FS Lancaster	--	46	31	230					4	48	54	55								
Herndon silty clay loam	B-3	29-4 Lancaster	Upper	46	31	232					5	46	60	62								
Herndon silty clay loam	B-3	7a Richland	Upper	43	29	241	1	32	46	56	1	38	40	45								
Herndon silty clay loam	C-3	29-6 Lancaster	Upper	46	31	227					5	61	62	56								
Herndon silty clay loam	C-3	19-2a Edgefield	Lower	46	28	234	5	35	79	91												
Hiwassee sandy loam	B-1	60-19 Newberry	Upper	46	28	224	5	42	81	88												
Hiwassee sandy loam	D-2	60-26 Newberry	Mid	47	28	224	5	34	57	67												
Hiwassee fine sandy loam	B-2	12-1 Chester	Lower	47	30	232	5	32	64	79	5	39	64	73								
Hiwassee loam	B-1	714 Pickens	Upper	70	37	194					2	32	68	87	2	31	66	87				
Hiwassee clay loam	B-3	627 Newberry	Upper	45	28	232	2	34	60	72												
Hiwassee clay loam	B-3	12-4 Chester	Upper	47	30	232					5	43	55	61								
Hiwassee clay loam	E-3	627 Newberry	Upper	45	28	232	1	49	67	68	1	43	55	61								

Appendix Table 1 - Soil Site Index Correlation Plot Data for Four Southern Pines in the Southern Piedmont of South Carolina (Land Resource Area 136)

SOIL MAPPING UNIT		PLOT NUMBER AND COUNTY	SLOPE POSITION	CLIMATIC INFORMATION			TREE MEASUREMENTS 1/															
				PRECIPITATION			LOBLOLLY PINE				SHORTLEAF PINE				VIRGINIA PINE				LONGLEAF PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES			ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Iredell sandy loam	A-1	0 Cheater		47	30	228					1	--	--	50								
Iredell sandy loam	A-1	0 Chester		47	30	228					1	--	--	54								
Iredell sandy loam	B-2	60-8 Spartanburg	Mid	49	25	215					4	31	44	62								
Iredell sandy loam	B-2	60-37 Fairfield	Mid	46	28	233	5	39	56	62												
Lloyd sandy loam	B-1	95FS Union	--	49	27	210					5	68	74	64								
Lloyd sandy loam	B-1	648 Laurens	Upper	49	29	218					1	40	62	70								
Lloyd sandy loam	A-2	693 Greenwood	Upper	48	28	229	2	33	59	71												
Lloyd sandy loam	B-2	660 Laurens	Mid	48	28	220	2	33	61	74	2	32	53	70								
Lloyd sandy loam	B-2	559 Fairfield	Mid	45	28	236	4	38	70	78												
Lloyd sandy loam	B-2	560 Fairfield	Mid	45	28	236	3	50	80	80												
Lloyd sandy loam	B-2	705 Greenwood	Mid	48	27	230	3	37	56	75												
Lloyd sandy loam	B-2	682 Anderson	Mid	54	30	218					3	41	62	70								
Lloyd sandy loam	C-2	683 Anderson	Upper	55	31	220					3	43	59	63								
Lloyd sandy loam	C-2	659 Laurens	Mid	49	29	222	1	41	67	73												
Lloyd sandy loam	C-2	703 Greenwood	Mid	48	27	230	2	34	62	73												
Lloyd sandy loam	C-2	659 Laurens	Lower	49	29	222	2	35	67	78												
Lloyd sandy loam	D-2	683 Anderson	Upper	55	31	220					3	47	67	70								
Lloyd sandy loam	E-2	626 Newberry	Mid	45	28	232	3	36	81	92												
Lloyd fine sandy loam	B-1	332 Edgefield	Mid	45	28	237	3	33	65	78												
Lloyd fine sandy loam	B-2	336 Edgefield	Upper	45	29	239	5	38	76	86												
Lloyd fine sandy loam	B-2	332 Edgefield	Mid	45	28	237	2	34	65	77												
Lloyd fine sandy loam	C-2	336 Edgefield	Mid	45	29	239	2	38	87	98*												
Lloyd fine sandy loam	C-2	332 Edgefield	Mid	45	28	237	3	34	61	73												
Lloyd loam	A-1	696 Greenwood	--	48	27	230	2	31	75	95*												
Lloyd loam	C-1	98FS Union	--	49	27	210					3	55	64	61								
Lloyd loam	C-1	142FS Pickens	--	58	28	208					4	37	54	64								
Lloyd loam	C-1	733 Oconee	Upper	59	28	205					2	35	45	53								
Lloyd loam	D-1	102FS York	--	49	25	214					4	64	69	62								
Lloyd loam	F-1	754 Oconee	Mid	68	31	202					3	32	62	79								
Lloyd loam	C-2	60-18 Newberry	Upper	45	28	232	5	38	77	86												
Lloyd loam	C-2	699 Greenwood	Mid	48	28	229	2	38	73	82												
Lloyd loam	D-2	734 Oconee	Mid	58	28	205					2	49	75	76								
Lloyd loam	D-2	828 York	Mid	48	26	218					2	35	69	84*								
Lloyd loam	E-2	753 Oconee	Upper	68	31	202					1	36	58	70								
Lloyd loam	E-2	753 Oconee	Mid	68	31	202					2	37	65	75								
Lloyd loam	E-2	733 Oconee	Mid	59	28	205					3	33	59	73								
Lloyd sandy clay loam	C-3	72 Lancaster	Mid	47	31	228	3	33	50	60												
Lloyd sandy clay loam	C-3	67 York	Mid	48	26	221					6	46	55	57								
Lloyd clay loam	B-3	687 Anderson	Upper	56	30	215					3	31	48	62								
Lloyd clay loam	B-3	533 Spartanburg	Upper	56	28	200									3	36	50	58				
Lloyd clay loam	B-3	24-2b Greenwood	Mid	48	28	231	5	43	87	93												
Lloyd clay loam	C-3	19-3 Edgefield	Upper	46	28	237	5	43	69	74												
Lloyd clay loam	C-3	730 Oconee	Upper	59	29	205					2	59	73	67								
Lloyd clay loam	C-3	67 York	Mid	48	26	221					4	46	54	56								
Lloyd clay loam	C-3	703 Greenwood	Mid	48	27	230					2	36	59	71								
Lloyd clay loam	C-3	828 York	Mid	48	26	218					2	33	56	70								
Lloyd clay loam	C-3	593 Abbeville	Mid	49	29	221	2	32	61	75												
Lloyd clay loam	C-3	703 Greenwood	Mid	48	27	230	1	34	61	72												
Lloyd clay loam	D-3	533 Spartanburg	Upper	56	28	200									1	37	58	67				
Lloyd clay loam	D-3	0 Fairfield	Mid	46	28	232	1	--	--	73												
Lloyd clay loam	D-3	0 Fairfield	Mid	46	28	232	1	--	--	68												
Lloyd clay loam	D-3	533 Spartanburg	Mid	56	28	200					1	36	52	61	1	33	55	67				
Lloyd clay loam	E-3	750 Oconee	Lower	60	30	205					2	43	61	66								
Local alluvial land, well drained	A-1	42 Union		48	25	219	1	30	84	109												
Local alluvial land, well drained	A-1	5a Richland		44	29	240	1	32	75	92												
Local alluvial land, well drained	A-1	573 McCormick		49	28	227	2	36	91	105												
Local alluvial land, well drained	A-1	689 Greenwood		48	28	230	2	34	75	88												
Local alluvial land, well drained	A-1	704 Greenwood		48	27	230	1	32	81	100												
Local alluvial land, well drained	A-1	52 Cheater		47	30	228	1	40	77	85												
Local alluvial land, well drained	A-1	56 Cheater		47	30	229	1	31	66	82												
Local alluvial land, well drained	A-1	43 Union		48	25	219	5	34	75	89												
Local alluvial land, well drained	A-1	48 Union		48	25	220	2	40	78	86	1	40	73	81								
Local alluvial land, well drained	A-1	0 Fairfield		46	28	232	1	--	--	83												
Local alluvial land, well drained	A-1	590 Abbeville		49	28	220					1	33	53	64								
Local alluvial land, well drained	A-1	728 Oconee		60	29	204					1	43	71	76								

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SOIL MAPPING UNIT				CLIMATIC INFORMATION			TREE MEASUREMENTS 1/															
				PRECIPITATION			LOBLOLLY PINE				SHORTLEAF PINE				VIRGINIA PINE				LONGLEAF PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES	PLOT NUMBER AND COUNTY	SLOPE POSITION	ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Local alluvial land, well drained (cont'd.)	B-1	47 Union		48	25	219	2	35	72	84												
Local alluvial land, well drained	B-1	335 Edgefield		45	29	239	3	34	70	84												
Local alluvial land, well drained	B-1	47 Union		48	25	219	2	34	73	87												
Local alluvial land, well drained	B-1	42 Union		48	25	219	2	31	75	94												
Local alluvial land, well drained	B-1	333 Edgefield		45	29	239	1	39	80	90												
Local alluvial land, well drained	B-1	59 Chester		47	29	230					2	44	63	68								
Lockhart sandy loam	C-1	60-32 Newberry	Mid	47	28	224	4	39	77	85												
Lockhart sandy loam	D-1	821 Chester	Upper	48	29	224	3	39	69	74												
Lockhart sandy loam	D-1	822 Chester	Upper	48	29	223					2	42	65	70								
Lockhart sandy loam	E-1	44 Union	Upper	49	25	219					4	49	59	60								
Lockhart sandy loam	E-1	44 Union	Mid	49	25	219					1	49	59	60								
Lockhart sandy loam	B-2	825 Chester	Upper	48	29	223					2	37	61	72								
Lockhart sandy loam	B-2	60-31 Newberry	Mid	47	28	224	5	50	74	74												
Lockhart sandy loam	B-2	60-29 Newberry	Mid	47	28	224	5	58	81	77												
Lockhart sandy loam	B-2	42 Union	Lower	48	25	219	1	31	70	89*												
Lockhart sandy loam	C-2	49 Union	Upper	49	25	219					5	53	69	65								
Lockhart sandy loam	C-2	824 Chester	Mid	48	29	224	3	47	75	78	1	64	80	70								
Lockhart sandy loam	C-2	0 Chester	Mid	47	30	228					1	--	--	67								
Lockhart sandy loam		0 Chester		47	30	228	1	--	--	68												
Lockhart clay loam	B-3	821 Chester	Upper	48	29	224	1	30	66	85												
Lockhart clay loam	C-3	621 Newberry	Upper	47	28	221	3	46	69	71												
Lockhart clay loam	C-3	0 Chester	Mid	47	30	228					1	--	--	55								
Louisa clay loam	D-3	542 Spartanburg	Upper	51	26	210					1	43	62	68								
Louisburg sandy loam	B-2	74 Newberry	Upper	48	28	218	2	52	72	71	1	52	59	58								
Louisburg sandy loam	C-2	830 York	Mid	48	26	219					1	35	63	76								
Louisburg sandy loam	D-2	334 Edgefield	Upper	45	29	239	3	41	70	76												
Louisburg sandy loam	D-2	334 Edgefield	Mid	45	29	239	3	43	74	78												
Louisburg sandy loam	E-2	771 Greenville	Upper	60	31	208									1	47	78	80				
Louisburg sandy loam	E-2	771 Greenville	Mid	60	31	208					3	45	68	73	1	43	80	85				
Louisburg sandy loam	E-2	830 York	Mid	48	26	219					2	33	62	78								
Louisburg sandy loam	E-2	772 Greenville	Mid	64	31	200					2	31	63	80	1	33	64	79				
Louisburg sandy loam	E-2	48 Union	Lower	48	25	220	1	46	94	97*												
Louisburg sandy loam	F-2	770 Greenville	Lower	60	31	210					2	31	59	76	2	33	67	83				
Madison sandy loam	C-1	545 Cherokee	Upper	50	31	214					1	64	60	53								
Madison sandy loam	B-2	587 Abbeville	Upper	49	29	223	2	45	60	64												
Madison sandy loam	B-2	673 Anderson	Upper	51	30	221	3	42	57	61												
Madison sandy loam	B-2	758 Greenville	Upper	57	31	220	1	41	58	65	2	40	58	63								
Madison sandy loam	B-2	547 Cherokee	Lower	50	31	212	2	32	47	60	2	32	57	72								
Madison sandy loam	C-2	546 Cherokee	Upper	50	31	214	4	37	47	54												
Madison sandy loam	C-2	546 Cherokee	Mid	50	31	214	3	30	44	57												
Madison sandy loam	D-2	538 Spartanburg	Upper	52	27	203					2	45	63	67								
Madison sandy loam	D-2	538 Spartanburg	Mid	52	27	203					3	56	71	67								
Madison sandy loam	E-2	537 Spartanburg	Lower	52	27	203					4	31	45	58								
Madison sandy loam	F-2	674 Anderson	Mid	50	30	223					2	37	47	55								
Madison clay loam	B-3	763 Greenville	Upper	51	30	222					4	35	53	64								
Madison clay loam	C-3	681 Anderson	Upper	54	30	218					2	68	87	75								
Madison clay loam	C-3	60-2 Cherokee	Lower	50	26	208					5	38	45	53								
Masada sandy loam	C-1	781 Greenville	Mid	59	31	208					2	32	64	81	2	38	69	77				
Mecklenburg sandy loam	C-1	563 Fairfield	Lower	45	28	238					2	48	77	79*								
Mecklenburg sandy loam	B-2	625 Newberry	Mid	45	28	232	1	38	68	77												
Mecklenburg sandy loam	C-2	574 McCormick	Upper	49	28	227	4	33	67	81												
Mecklenburg sandy loam	D-2	625 Newberry	Mid	45	28	232	3	39	67	74												
Mecklenburg clay loam	B-3	0 Chester	Mid	47	30	228					1	--	--	45								
Mecklenburg clay loam	B-3	60-11 Spartanburg	Lower	50	25	213					4	34	74	89*								
Mecklenburg clay loam	C-3	60-33 Chester	Mid	47	30	232					4	40	51	57								
Mixed alluvial land, well drained	A-1	0-11 Oconee		75	34	197					2	51	89	88								
Mixed alluvial land, well drained	A-1	74a Saluda		44	24	233	1	44	79	84												
Mixed alluvial land, poorly drained	A-1	48 Union		48	25	220	1	43	88	94												
Mixed alluvial land, poorly drained	A-1	65 York		48	26	221					1	35	64	77								
Orange silt loam	A-1	32-3 Lexington		44	28	237	5	35	57	65												
Orange silt loam	A-1	36-8 Newberry		45	28	232	1	31	65	82*												
Orange silt loam	B-2	24-1 Greenwood		48	28	231	5	39	60	69												
Roanoke silt loam	A-1	89 Chesterfield		46	31	218	3	37	79	91												
Tatum silt loam	B-2	60-24 York	Mid	49	26	220					5	44	60	64								
Tatum silt loam	B-2	29-1 Lancaster	Mid	46	31	226					6	58	74	69								

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SOIL MAPPING UNIT				CLIMATIC INFORMATION			TREE MEASUREMENTS 1/															
				PRECIPITATION			LOBLOLLY PINE				SHORTLEAF PINE				VIRGINIA PINE				LONGLEAF PINE			
SERIES, TYPE, AND PHASE	SLOPE & EROSION CLASSES	PLOT NUMBER AND COUNTY	SLOPE POSITION	ANNUAL Inches	GROWING SEASON Inches	FROST-FREE PERIOD Days	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX	NO. TREES	AGE	HEIGHT	SITE INDEX
Tatum silt loam (cont'd.)	B-2	29-2 Lancaster	Mid	46	31	228					5	48	59	60								
Tatum silt loam	B-2	60-23 York	Lower	49	26	220									5	37	66	78				
Tatum silt loam	B-2	60-20 York	Lower	49	26	220					5	48	59	60								
Tatum silt loam	C-2	60-25 York	Upper	49	26	220					3	33	69	85*								
Tatum silty clay	B-3	60-22 York	Upper	49	26	220					5	33	61	78								
Tirzah silt loam	C-2	40-3 Richland	Upper	43	29	241	4	37	77	87												
Tirzah silt loam	E-2	24-2a Greenwood	Mid	48	28	231	4	45	91	95*												
Tirzah silty clay loam	D-3	581 McCormick	Upper	46	28	234	1	30	54	70												
Tirzah silty clay loam	D-3	581 McCormick	Mid	46	28	234	2	34	62	74												
Vance sandy loam	C-1	1-2 Abbeville	Mid	49	29	222	3	31	64	81												
Vance sandy loam	B-2	1-1 Abbeville	Lower	49	29	222	4	35	56	66	1	45	56	59								
Wehadkee fine sandy loam	A-1	563 Fairfield		45	28	238	2	49	107	108												
Wehadkee fine sandy loam	A-1	700 Greenwood		48	27	230	2	45	100	105												
Wickham loamy sand	C-1	551 Fairfield	Lower	45	28	235	1	30	74	95												
Wickham loamy sand	B-2	558 Fairfield	Lower	45	28	236	1	30	75	95												
Wickham sandy clay loam	F-3	582 McCormick	Upper	45	28	237	1	47	65	67	3	43	58	63								
Wilkes fine sandy loam	C-2	60 Chester	Upper	47	30	231	3	36	63	73												
Wilkes fine sandy loam	C-2	53 Chester	Lower	47	28	227	6	34	56	66												
Wilkes fine sandy loam	E-2	654 Laurens	Mid	49	29	220	1	44	70	74												
Wilkes fine sandy loam	E-2	557 Fairfield	Mid	45	29	237	2	33	62	75*												
Wilkes fine sandy loam	E-2	333 Edgefield	Mid	45	29	239	3	38	68	78*												
Wilkes fine sandy loam	E-2	333 Edgefield	Lower	45	29	239	1	42	82	89*												
Wilkes fine sandy loam	F-2	77 Newberry	Mid	47	28	223	6	40	65	71												
Wilkes fine sandy loam	F-2	553 Fairfield	Lower	46	28	233	3	43	66	69												
Worsham sandy loam	A-1	407 Lexington		43	29	239													1	70	82	70
Worsham sandy loam	B-1	65 York	Lower	48	26	221					8	31	51	66								
Worsham sandy loam	D-2	62 York	Lower	48	26	221					2	51	72	71								
Gullied land, firm material	D-4	61 York	Upper	48	26	221					1	31	35	44								
Gullied land, firm material	D-4	61 York	Mid	48	26	221					3	32	35	43	1	31	46	58				
Gullied land, firm material	D-4	66 York	Mid	48	26	222					2	43	44	48								
Gullied land, firm material	D-4	662 Laurens	Mid	49	28	217									1	36	48	55				
Gullied land, firm material	E-4	556 Fairfield	Upper	45	28	236	3	37	68	77*	2	35	58	69								
Gullied land, firm material	E-4	557 Fairfield	Mid	45	29	237	2	37	69	79*												
Gullied land, firm material	F-4	557 Fairfield	Upper	45	29	237	3	36	62	72*												
Gullied land, firm material	F-4	557 Fairfield	Mid	45	29	237	2	38	60	66*												
Gullied land, friable material	C-4	46 Union	Upper	49	25	219					2	33	46	57								
Gullied land, friable material	C-4	46 Union	Mid	49	25	219					1	41	60	67								
Gullied land, friable material	C-4	61 York	Mid	48	26	221									1	31	46	58				
Gullied land, friable material	C-4	55 Chester	Mid	48	30	226	2	38	58	66	1	42	52	57								
Gullied land, friable material	E-4	46 Union	Mid	49	25	219					1	39	48	54								
Gullied land, friable material	E-4	46 Union	Lower	49	25	219					2	49	54	55								

*Plot influenced by favorable moisture condition, therefore, data is not included in computation of average site indexes.

Appendix Table 2 - Abridged Stand and Yield Information per Acre for Well-Stocked, Unmanaged, Normally Growing Virginia Pine.

[Statistics in this table compiled from Technical Bulletin No. 100, North Carolina State College, and from Research Note No. 135, SE Forest Experiment Station]

Age	Total height of average dominant trees	Trees per acre	Average diameter at breast height	Basal area per acre	Potential yields per acre			Mean annual growth per acre		
Years	*Feet*	*Number*	*Inches*	*Sq. ft.*	*Cu. ft.*	*Cords* [1]	*Bd. ft.* [2]	*Cu. ft.*	*Cords*	*Bd. ft.* [3]
					Site Index 40					
20	19	2, 500	2. 1	60	390	4	----------	19	0. 2	----------
30	29	1, 660	3. 4	104	1, 250	14	5, 900	42	. 5	197
40	36	1, 300	4. 2	125	1, 630	18	7, 700	41	. 4	192
50	40	1, 110	4. 7	133	1, 820	20	8, 600	37	. 4	172
60	42	1, 010	5. 0	138	1, 980	22	9, 400	33	. 4	156
70	43	910	5. 3	139	2, 100	23	9, 900	30	. 3	141
					Site Index 50					
20	25	2, 000	2. 8	86	960	11	----------	48	. 5	----------
30	37	1, 320	4. 2	127	2, 000	22	9, 500	67	. 6	317
40	45	970	5. 2	142	2, 700	30	12, 800	67	. 7	320
50	50	790	5. 9	151	3, 100	34	14, 700	62	. 7	294
60	52	750	6. 1	153	3, 400	38	16, 100	57	. 6	268
70	54	700	6. 4	156	3, 600	40	17, 100	51	. 6	244
					Site Index 60					
20	31	1, 710	3. 4	108	1, 600	18	7, 600	80	. 9	380
30	44	1, 030	5. 0	140	2, 650	29	12, 500	85	1. 0	417
40	54	720	6. 3	156	3, 630	40	17, 200	88	1. 0	430
50	60	580	7. 2	164	4, 300	47	21, 000	86	. 9	420
60	63	520	7. 7	168	4, 720	52	22, 400	79	. 9	373
70	65	490	8. 0	170	5, 050	56	23, 900	72	. 8	341
					Site Index 70					
20	37	1, 460	4. 0	127	1, 700	19	8, 100	85	. 9	405
30	52	790	6. 0	154	3, 200	35	15, 200	107	1. 2	509
40	63	540	7. 5	167	4, 360	48	21, 400	109	1. 2	535
50	70	410	8. 9	176	5, 200	58	24, 600	104	1. 2	492
60	73	360	9. 6	179	5, 700	63	27, 000	95	1. 0	450
70	75	340	9. 8	180	6, 150	68	29, 200	88	1. 0	419
					Site Index 80					
20	42	1, 230	4. 5	136	1, 950	22	9, 200	98	1. 1	460
30	59	630	6. 9	163	3, 500	39	16, 600	117	1. 3	553
40	72	380	9. 3	178	4, 900	54	23, 200	123	1. 4	580
50	80	230	12. 2	186	5, 800	64	27, 400	116	1. 3	548
60	83	190	13. 6	189	6, 430	72	30, 400	107	1. 2	506
70	85	160	14. 6	191	6, 900	77	32, 800	98	1. 1	469

[1] Converting factor: 90 cubic feet per cord.
[2] International ¼-inch rule. Converting factor: 4.74 board feet per cubic foot.
[3] International ¼-inch rule.

Appendix Table 3. Abridged Stand and Yield Information Per Acre for Well-stocked, Unmanaged, Normally Growing, Loblolly, Shortleaf, Longleaf, and Slash Pines. (Adapted from U. S. Department of Agriculture, Miscellaneous Publication No. 50) 1/

Site Index	Age	LOBLOLLY PINE			SHORTLEAF PINE			LONGLEAF PINE			SLASH PINE		
		Total Merchantable Volume		Average Diameter at Breast Height	Total Merchantable Volume		Average Diameter at Breast Height	Total Merchantable Volume		Average Diameter at Breast Height	Total Merchantable Volume		Average Diameter at Breast Height
	Years	Cords	Bd.Ft. (Scribner)	Inches	Cords	Bd.Ft. (Scribner)	Inches	Cords	Bd.Ft. (Scribner)	Inches	Cords	Bd.Ft. (Scribner)	Inches
50	20	–	–	–	–	–	3.2	4	–	2.8	–	–	–
	30	–	–	–	23	50	4.8	11	200	4.1	–	–	–
	40	–	–	–	33	1,450	6.1	17	900	5.1	–	–	–
	50	–	–	–	43	4,400	7.3	21	2,100	5.9	–	–	–
	60	–	–	–	48	8,150	8.3	25	3,700	6.6	–	–	–
	70	–	–	–	51	11,600	9.1	28	5,400	7.2	–	–	–
	80	–	–	–	53	14,400	9.9	31	7,250	7.8	–	–	–
60	20	12	–	4.6	12	–	3.8	8	50	3.3	20	–	4.4
	30	25	1,250	6.6	32	750	5.7	19	900	4.9	32	1,050	6.1
	40	35	4,500	8.1	46	4,400	7.3	27	2,800	6.0	40	4,100	7.6
	50	41	8,550	9.4	54	10,600	8.4	34	5,900	7.0	45	7,500	8.6
	60	46	12,250	10.4	60	15,850	9.7	40	9,300	7.8	48	10,500	9.3
	70	49	15,250	11.2	65	19,700	10.6	45	12,350	8.5	–	–	–
	80	51	17,550	11.9	68	22,600	11.4	49	15,000	9.1	–	–	–
70	20	17	100	5.4	18	–	4.5	14	200	3.8	28	–	5.2
	30	31	3,500	7.8	41	2,400	6.6	28	2,000	5.5	40	3,500	7.3
	40	42	9,400	9.6	56	9,900	8.4	39	6,100	6.8	49	9,300	8.9
	50	50	15,200	10.9	66	17,850	9.8	48	11,400	7.9	55	14,250	10.0
	60	55	19,600	12.1	73	23,450	11.0	55	16,400	8.8	59	17,400	10.8
	70	59	22,550	13.0	79	27,550	12.0	62	20,400	9.6	–	–	–
	80	62	24,600	13.8	83	30,700	12.8	67	23,700	10.3	–	–	–
80	20	22	700	6.2	25	200	5.2	20	550	4.3	35	900	6.0
	30	38	6,500	8.7	48	5,200	7.5	36	3,800	6.1	48	7,300	8.3
	40	51	14,800	10.7	65	16,200	9.5	49	10,800	7.6	58	15,150	10.1
	50	60	21,700	12.2	77	24,900	11.1	61	17,600	8.8	65	20,350	11.4
	60	66	26,400	13.6	85	30,900	12.3	70	23,500	9.8	69	23,600	12.2
	70	70	29,500	14.6	92	35,200	13.3	78	28,300	10.6	–	–	–
	80	73	31,550	15.5	97	38,550	14.2	85	32,100	11.5	–	–	–
90	20	27	1,600	6.9	30	1,100	6.1	26	1,000	4.7	41	2,750	6.8
	30	46	10,700	9.6	54	11,200	8.8	43	6,500	6.7	54	12,300	9.4
	40	61	20,550	11.7	73	23,400	10.9	59	15,800	8.3	66	20,600	11.4
	50	71	28,250	13.6	87	32,400	12.6	72	24,100	9.6	73	25,900	12.9
	60	78	33,100	15.0	98	38,700	14.0	84	31,000	10.7	78	29,600	13.9
	70	82	36,600	16.2	105	43,000	15.2	94	36,200	11.6	–	–	–
	80	85	39,100	17.2	112	46,500	16.2	103	40,600	12.5	–	–	–
100	20	32	2,750	7.4	33	3,200	7.3	30	1,700	5.2	46	5,050	7.7
	30	53	14,800	10.4	60	17,700	10.4	49	10,150	7.4	59	16,850	10.5
	40	71	26,700	12.8	82	30,600	12.8	66	20,200	9.0	72	25,450	12.8
	50	84	35,050	14.7	99	40,000	14.7	82	29,550	10.5	81	31,250	14.5
	60	92	41,000	16.2	111	46,400	16.2	96	37,400	11.7	86	35,400	15.5
	70	96	44,750	17.6	121	50,900	17.5	108	43,000	12.7	–	–	–
	80	100	47,400	18.6	128	54,400	18.6	118	48,100	13.7	–	–	–

Appendix Table 3. Abridged Stand and Yield Information Per Acre for Well-stocked, Unmanaged, Normally Growing, Loblolly, Shortleaf, Longleaf, and Slash Pines. (Adapted from U. S. Department of Agriculture, Miscellaneous Publication No. 50) 1]

Site Index	Age	LOBLOLLY PINE			SHORTLEAF PINE			LONGLEAF PINE			SLASH PINE		
		Total Merchantable Volume		Average Diameter at Breast Height	Total Merchantable Volume		Average Diameter at Breast Height	Total Merchantable Volume		Average Diameter at Breast Height	Total Merchantable Volume		Average Diameter at Breast Height
	Years	Cords	Bd.Ft. (Scribner)	Inches	Cords	Bd.Ft. (Scribner)	Inches	Cords	Bd.Ft. (Scribner)	Inches	Cords	Bd.Ft. (Scribner)	Inches
110	20	37	4,300	7.9	-	-	-	34	2,550	5.6	-	-	-
	30	62	19,200	11.2	-	-	-	54	13,000	7.9	-	-	-
	40	82	32,800	13.7	-	-	-	73	24,400	9.8	-	-	-
	50	96	42,500	15.7	-	-	-	90	34,200	11.4	-	-	-
	60	106	49,200	17.4	-	-	-	106	42,100	12.7	-	-	-
	70	112	53,100	18.8	-	-	-	119	48,600	13.8	-	-	-
	80	116	55,900	20.0	-	-	-	130	54,000	14.9	-	-	-
120	20	42	6,500	8.5	-	-	-	-	-	-	-	-	-
	30	70	24,350	11.9	-	-	-	-	-	-	-	-	-
	40	93	39,600	14.6	-	-	-	-	-	-	-	-	-
	50	110	50,100	16.8	-	-	-	-	-	-	-	-	-
	60	121	57,250	18.6	-	-	-	-	-	-	-	-	-
	70	128	62,000	20.0	-	-	-	-	-	-	-	-	-
	80	134	65,000	21.2	-	-	-	-	-	-	-	-	-

1] Cords = rough wood from trees 4 inches diameter breast height and over (from Tables 46, 110, 142, and 78).
Board Feet = Scribner Decimal C rule, trees 8 inches diameter breast height and over (from tables 55, 56, 119, 120, 151, 152, 87, and 88).
Average Diameter = Dominant stand (from Tables 59, 91, 123, and 155).